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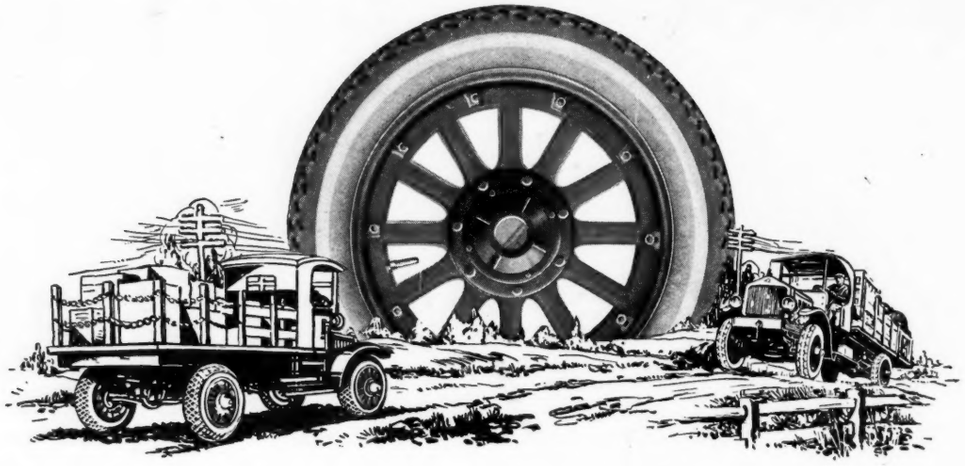

# Hub Standardization is coming

In every instance where standard dimensions and designs have been instituted throughout the Automotive Industry, profitable results have more than justified their adoption. In the case of thread dimensions, tire sizes, brake lining sizes, oil cup dimensions, piston ring sizes and spark plug connections, standardization has eliminated confusion, produced better parts, simplified servicing and reduced manufacturing costs.

It is to be regretted, therefore, that uniformity has not been attained in wheel hubs. For although nearly two hundred types are in service today, approximately 80% could be eliminated and all practical needs still would be satisfied.

Hub Standardization is coming. It means definite savings in the production of axles, bearings, hubs, and wheels. It means interchangeability, simplified parts and more efficient servicing.

The Automotive Wood Wheel Manufacturers' Association is a determined champion of Hub Standardization. It is prepared to furnish data on the subject to those who are interested. Address communications to the office of the Association.

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**Automotive Wood Wheel Manufacturers' Association**

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLIV NEW YORK—THURSDAY, MARCH 24, 1921 No. 12

# Things To Consider If You Would Sell Trucks

**There is much more to the selling of trucks than the mere obtaining of dealers, sending salesmen to see prospects, and getting the name on the dotted line. There still remains the huge problem of establishing a motor transportation industry.**

A MAN who has given more than 20 years of a busy life to the study of the motor truck and its problems said recently:

"It is my belief that 75 per cent of the motor truck sales to-day have been misfits."

Rather startling comment!

It might be well to follow this motor truck student in his reasoning:

"Salesmanship has so far been based upon the motor. Every manufacturer, and consequently his salesmen, have been anxious to place their motors in the hands of the men who can use them. This desire has been so overmastering that little thought has been given to the methods.

"In recent years some salesmen have studied the problems that the trucks were called upon to do, but still they have considered that problem almost entirely from the view of the motor.

"It is my thought that the truck user should be sold on the body, or in other words, on the economy and convenience of handling his particular merchandise problem. Once the salesman sells him on this problem, the buyer will not care much about the motor, except to be assured that it is a worthy piece of machinery and is suitable to move the bodies that he needs to handle his freight."

The above is condensed from the beginning of a conversation that ran well into an entire evening. It ran into the difficulties of the very large trucks, the danger of taxing heavy trucks off of the road, the misuse of trucks generally and finally an agreement of all concerned that the solution of congestion, heavy wheel load and numerous kindred problems lies in putting the heavy loads on more wheels, just as the railroads have solved the same problem.

This solution, of course, lies in the trailer or the semi-trailer. The latter was greatly favored by the persons engaged in this entirely informal conference.

Another thing agreed upon was this:

> **The greatest handicap the truck has today is the waste caused by the misfit sales. Owing to the fact that the truck does not fit the job it is intended for, it is not giving the efficient service that it should. Every truck that is not giving this efficient service, is blocking the sale of other trucks.**

These things were all discussed a few days before Alfred Smith, former governor of New York and later Chairman of the Board of the United States Trucking Corp., spoke before the National Automobile Chamber of Commerce. Smith was invited to tell to the men who make the trucks the troubles of his company. It was interesting to note that he said most of the things that entered into the conversation referred to, and then he said some more. Smith outlined for the truck manufacturers a good many things

that he thought they would have to do before the truck becomes a truly economic transportation medium in New York. He might have added, but he didn't, that the problems of the country are simply intensified in New York and when all of the New York wrinkles are ironed out, then the truck industry will be ready to go ahead with assurance.

**A waste of truck time and ability is the great inefficiency Smith saw in trucks under present conditions in New York. He said that in most traffic in lower New York, the horse is more economical than the truck, because of the congestion. It is a lot less expensive for a horse and wagon than for a truck to wait for a shipment at a pier.**

He said that it costs his company about $20 a day to operate a motor truck and that under ordinary conditions this truck loses three hours or more a day waiting, so that the charge necessary is not in keeping with the service rendered.

The remedy, as Smith sees it, is for all business to urge the adoption of the store door delivery plan. This plan, he said, would permit the efficient use of trucks. Trailers of the proper variety can be placed upon the piers and loaded at night, so that in the morning each motor can go to the pier, pick up a capacity load and depart on its errand without a loss of time. Under the present plan, he said, it is often the case that the piers are so jammed with trucks and horses, each outfit calling to obtain a small shipment, that each is in the way of some other vehicle and not 50 per cent of them leave the piers with a full load.

### Why the Opposition

He said that the opposition to the store door delivery plan is now confined to mercantile establishments that maintain fleets of trucks bearing the name of the establishment for advertising purposes, and that for this reason the owners want these trucks to handle all of the work. Smith did not say, but he let it be inferred that he considers this advertising entirely too expensive and that the motor truck industry is bearing a good deal of the expense in the reflection that the truck is not efficient.

The former Governor said that he had been a good deal impressed by accounts of the freight handling job in Cincinnati, where, by use of interchangeable bodies, trucks are rendering a highly efficient service. Just what the reasonable radius of a truck haul is, he said, could not be measured until there is efficiency in handling the freight. No one would dispute the efficiency of the truck in the measure of covering ground as against the horse. Nor would any one argue the expense of maintaining idle equipment in dull times. He said that during the recent dull weeks his company had been maintaining between 400 and 500 idle horses. When he saw the feed bills, he earnestly wished that the entire equipment had been motorized, but when traffic demands are strong again, he would be thankful, because of the congestion in the streets, that he had horses.

After his talk Smith was asked what the reduction of traffic would be under the store door plan. The questioner said that he had been informed that store door delivery in Philadelphia would mean the elimination of half of the trucks engaged in this service. Smith answered that he believed that the store door plan would eliminate at least half of the traffic in the streets of lower New York.

The man who asked this question is one of the enthusiasts for store door delivery. He realizes that the greatest handicaps to the sale of his trucks to-day is the lack of efficiency of service due to conditions over which the purchaser of the truck has no control.

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**The points of view quoted in this article are those of men who have given thought to the future of the truck and are convinced that there is much more before the manufacturers as a group to prepare the way for proper selling of trucks.**

—

Just at this point in the writing of this article there came to the desk a booklet entitled "Vocational Selling as Applied to the Motor Truck Industry," published by the Duplex Truck Company. In this book are many ideas that point to a new way of selling trucks. Indeed, the idea as a whole is newer than many will realize.

In the ten years of development of motor transportation a lot of men have been bribed by money and promises to enter the truck selling field because they had successfully sold something else. In the main these men have not been examined fully as to their fitness as truck salesmen. Some few companies—the Pierce-Arrow is an example—have made an earnest endeavor to educate their salesmen up to a standard. But even the promoters of these educational plans will admit freely that they have not reached their ideal.

### Idea Not Always Working

Some companies have adopted the transportation and even the vocational idea in the selling of trucks. It is no criticism of this idea of selling trucks to state that a salesman for one of the companies that is pioneering in this idea has within the last few days lost a sale to a rival because he tried to sell the truck as a machine, while the salesman for a much less widely known truck put in his equipment on the transportation basis.

But to get back to this booklet on Vocational Selling. Some paragraphs can very well be quoted here:

**"We have spent too much time telling about spark plugs, axles, transmissions, etc., instead of showing the buyer the real results to be obtained by the proper use of the motor truck."**

Especially the PROPER part of it.

It is the improper use of motor trucks that has hurt. Too many men have not realized the heavy losses that would come to them as a result of congestion over which they have no control. Not being warned on this, they have attempted to make an entirely improper use of the motor truck; they have lost money and have become adherents of the horse-drawn vehicle—condemning the motor truck utterly.

Right here, let it be added that it is worse than foolish to sell a truck where it does not belong. In a recent conversation with a motor truck sales manager, the development of the TEC truck was referred to. This is a combination industrial and street truck. It is on the lines of the well known electric truck that is so much used in large plants and warehouses. The freight is loaded on a platform, the surface of which is only 27 in. from the ground. The truck backs under this platform and carries it and the freight to the destination and sets it down perhaps in the storage warehouse, without rehandling. There is nothing radically different about this truck from other industrial trucks except the size—5000 lb. freight capacity—and the wheels equipped for street use.

The sales manager referred to, markets road trucks. He hailed the new type as a much needed piece of equipment. He said that it would relieve his trucks of a great amount of unprofitable work. He cited this example. In New York there is a large amount of heavy traffic

for short distances. Aside from the combined warehouse and street problem, he pointed to the fact that in New York bricks are unloaded on the bank of the Hudson. Many of them are used within a mile or so of the dock. Road trucks have been used uneconomically for this haulage. There are several points involved: first, the loading of heavy material on a high truck platform; second, the necessity of the truck standing while it is loaded and unloaded; third, the congestion that delays the large equipment that would not so seriously check a smaller vehicle.

**The important point is this: The truck salesman welcomed this innovation in truck transportation because it would relieve his trucks of business that is likely to create prejudice against them.**

Again quoting from the booklet:

**"You know that any method of selling must benefit both the seller and the buyer if it is to be a long-lived method."**

That is very important but too obvious for discussion. It has not been the basis of many truck sales.

Frequently the booklet calls attention to the fact that transportation problems differ and the information that put one man right will not always serve for another. It tells salesmen that in the home office are many transportation analyses and that some of these will doubtless fit the case the salesman has in mind **IF HE WILL WRITE AN ACCURATE DESCRIPTION OF THE PROBLEM.**

Then follows a grouping of all known truck uses into their general classification, a valuable and interesting document. Forty-four body types for special uses are also named.

The solicitation, visitation and use of catalogues and other pertinent subjects are discussed. It is always kept in mind that it is not the chassis alone that is being sold.

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### Marketing Not Well Planned

To properly consider the details entering into this problem would require a book—a big one. Just a few general remarks in conclusion.

It is the history of industry that manufacturers frequently give much attention to the building they occupy, even greater attention to the design of the article they will make and that they will get the best advice on financing, and then they will pick a stranger to them and their product for the marketing job.

Frankly, between a good truck and an ordinary marketing department and an ordinary truck and an excellent marketing department, the writer would choose the latter combination. The best truck in the world is not much benefit to humanity or to business, if it is not properly sold.

Look over the truck list and draw conclusions as to why certain trucks and companies have succeeded.

Truck marketing—in the main—has been done very poorly. Truck advertising has been entirely uneconomical—perhaps crude.

In two recent monthly magazines there was an example of this:

**One magazine, which has absolutely no interest in trucking and which is read largely by society folk, readers of good literature and admirers of well-printed pictures, carried four full-page advertisements of trucks at say $300 a page.**

**Another magazine, with a circulation that goes practically 100 per cent to truck users—some of them owners of large fleets—had only seven pages of advertisements for eight trucks at $60 a page. The subscribers of the latter paper average about 10 trucks each in actual ownership.**

Think of the truck purchasing power of these two bodies of readers.

One of the most popular of truck advertising mediums asserts that its two largest classes of readers are lawyers and doctors!

### Other Important Factors

From time to time there have been printed in AUTOMOTIVE INDUSTRIES articles prepared on the vocational basis, reflecting the inquiries of business papers among their subscribers. These would appear to have a very direct bearing on the proper marketing of trucks.

As to the life of the truck and service—these are important topics in themselves. Such studies as "The First Fifty" by the Pierce-Arrow Motor Car Co. and the "Roll Call" figures by The White Co. should have a great influence in the arguments made for worthy trucks. There are many other companies that can tell a similar story of their early vehicles.

Recently an engine builder in discussing service said that his company was forced to enter this field to protect their engines in "orphan trucks" and trucks that were not properly serviced.

Just the other day a notice was sent out that a factory service manager had been "promoted" to sales manager. It would seem that this was turning the thing around. Certainly a man with a sales experience should better realize the need of service than any one else around the factory, and certainly the man with the responsibility on his shoulders for all of the trucks the company had ever made should be more important to the organization than the man whose obligation rests with current production—as do the obligations of many sales managers.

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# Cam Design

CAMS are rotating or oscillating pieces of mechanism having specially formed surfaces against which a follower slides or rolls and thus receives a reciprocating or intermittent motion such as cannot be generally obtained by gear wheel or link motions. Cams are a familiar form of mechanism in the automobile industry, but there are probably few automotive engineers who realize the great variety of cams. Prof. Franklin De Ronde Furman in his Cams, Elementary and Advanced (John Wiley & Sons, Inc.) distinguishes between the following types: Radial or disk cams, side or cylindrical cams, conical cams, spherical cams, periphery cams, plate cams, heart cams, frog cams, mushroom cams, plate groove cams, wiper cams and rolling cams. The book referred to contains eight sections of which the first five were printed four years ago under the title Elementary Cams. Displacement, velocity and acceleration diagrams are given for a large variety of cams applicable to internal combustion engines, together with outlines of the cams giving these curves. Much of the material, however, applies to cams for other classes of work. The processes of design illustrated are mostly graphical and are readily followed by practical shopmen and draftsmen, as well as by technical students.

# To Produce New Eight-Cylinder Engine for Use in Oldsmobile Chassis

**Engine will be produced in quantity, using new tool equipment especially designed for the purpose. Cylinders will have rolled finish in place of ground surface. Blocks and heads to be interchangeable. Pressure lubrication and high speed, two- bearing crankshaft among features.**

By J. Edward Schipper

FROM the engineering and production standpoints the new eight-cylinder Oldsmobile, known as Model 47, contains a number of interesting features. As this car is to be the quantity job of the Olds factory, and the engine is to be turned out in a plant specially tooled up for the purpose, it will undoubtedly be produced under conditions of unusual economy. More than $1,500,000 was spent on new tool equipment for the engine.

The chassis is practically identical with that of the four-cylinder model, but the new engine has features making for low labor cost. The price of the chassis equipped with touring body will be $1,695. Considering that the car is equipped with a four-passenger sport body with genuine leather upholstery, this price should certainly make a strong appeal to the buyer.

The engine is of conventional V type, the angle between the blocks being 90 deg. The cylinders are cast in groups of four, with removable cylinder heads, the major portion of the manifolds being integral. With cylinder dimensions of 2⅞ by 4½ in., the total displacement is 233.7 cu. in. The S. A. E. horsepower rating is 26.45, but the horsepower actually developed is 57 at 2600 r.p.m. The engine has three point suspension.

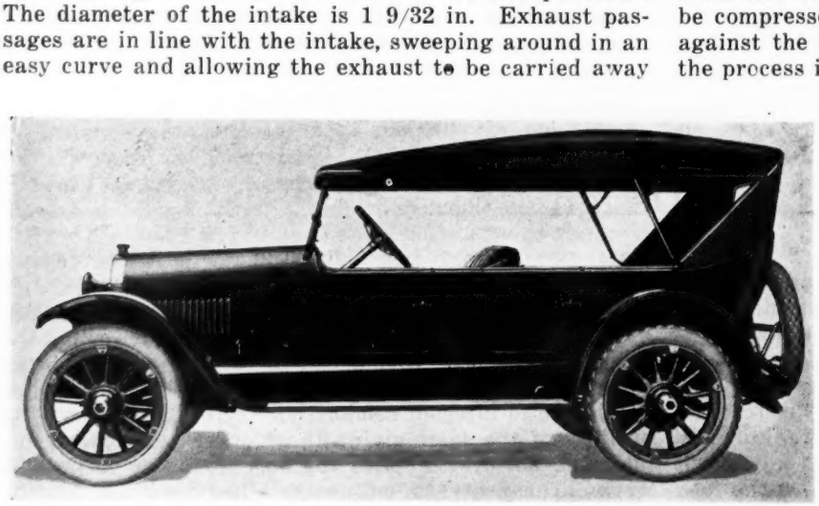
The valve passages are so arranged as to allow of a valve inclination of 6 deg. 17½ min. toward the cylinder axis, the object being to reduce the wall surface of the combustion chamber. Another noteworthy feature of the cylinder block is the integral intake manifold. Considerable study has been given to gas distribution, the intake being notable for the absence of abrupt bends. The diameter of the intake is 1 9/32 in. Exhaust passages are in line with the intake, sweeping around in an easy curve and allowing the exhaust to be carried away through a manifold bolted on top of the cylinder block.

The exhaust passages lie directly over and cross the intake passages, thus heating the intake. Cooling water circulates all around the cylinder bores and also around the intake and exhaust manifolds. Water from the pumps enters the jacket through tubes cast as part of the cylinder blocks. These tubes have five outlets, three being directly opposite the spaces between the cylinder barrels. Bosses are cast on the outside of the tube opposite the three center outlets, and holes are drilled through the bosses and the opposite wall of the tube, the holes through the bosses being afterward plugged. This is done to insure an even supply of water to all parts of the jacket. At each end of the cylinder block a wall is carried out, these two walls, with the inspection plate, entirely enclosing the valves.

### Cylinder Bores Rolled to Size

Probably the most interesting feature of the cylinder block, however, is its manufacture. The cylinders are not finished by grinding in the usual manner, but are rolled to their finished diameter. By this method of rolling the bores, the metal inside the cylinder is slightly compressed, giving a hard, glassy surface. The rolls surround a central spindle, the assembly thus resembling a roller bearing; each single roller in the tool is carefully gaged so that the entire assembly generates an absolutely true cylinder. This is made to the true size of the cylinder bore. In a previous machining operation from 0.0005 to 0.001 in. metal is left on the diameter to be compressed by rolling. The roll, which works in oil against the cylinder surface, compresses the metal and the process is said to give greater smoothness of surface and greater resistance to wear than can be obtained otherwise.

The two cylinder blocks are interchangeable, in spite of the fact that one block is set slightly ahead of the other. Semi-steel is employed for the cylinder head, which contains the combustion chambers. The heads for the four cylinders are a single casting, with combustion spaces of regular form. Bosses are cast on this head, to receive the compression cocks located in the cylinder axes, so that it is an easy matter to check the timing. The spark plugs are placed in the head directly over the intake valves, so that the inrushing gas will tend to keep the plugs clean and cool. The head is secured to the cylinder by fourteen 7/16-in.



*New Model 47 Oldsmobile*

cap screws, so located that all will be subjected to substantially equal strain by the explosion pressure. The right and the left cylinder heads are interchangeable.

The piston is a cast iron, three-ring type with a plain skirt, the third ring groove being beveled on the lower surface and holes drilled at 45 deg. to drain the oil back to the crankcase. The weight of this piston is 15 oz., and in assembling the pistons are selected so all eight in one engine vary but slightly from a fixed standard. The piston is fitted with a hollow piston pin of 21/32 in. diameter, locked in the boss by a tapered, pointed locking pin which is itself locked against looseness. The rings are 3/16 in. wide and are fitted closely in the grooves. The minimum clearance between the piston and cylinder bore is 0.002 in. and the maximum .0025 in. These pistons and the light rods used in connection with them are designed to make possible speeds as high as 3500 r.p.m., although the engine develops maximum power at 2600 r.p.m. A special fixture is used for line reaming the piston bosses square with the barrel of the piston, and both ends of the connecting rods are machined, so there is no possibility of misalignment.

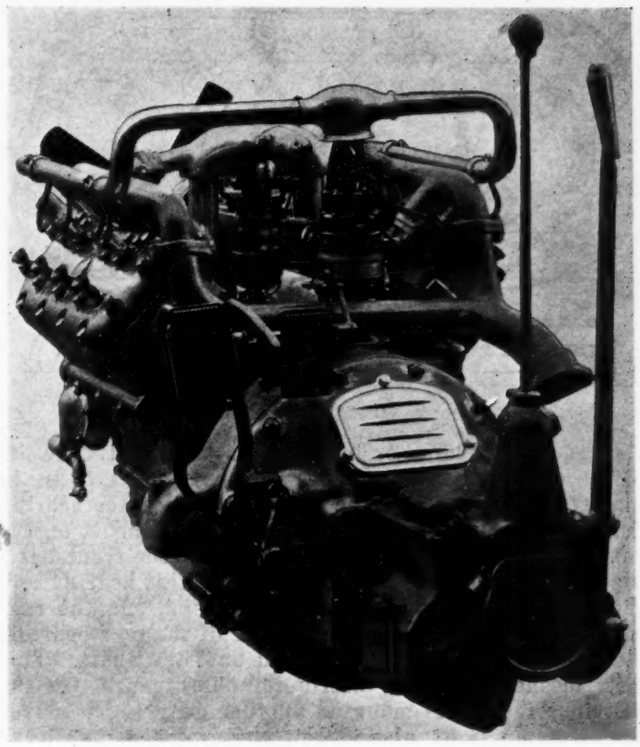
I-beam section connecting rods are employed, the section being constant throughout the length, measuring 13/16 in. in depth, 5/8 in. in width and 3/32 in. in thickness. The upper end of the rod is bushed. The rods are of high carbon steel and are heat-treated to a Brinell reading of 180 to 215.

### Two-Bearing Crankshaft Used

The crankshaft is forged of 1045 S. A. E. steel and is of the two-bearing type. Owing to the small bore and the use of block cylinders the crankshaft is unusually compact, allowing a stiff shaft, although only two main bearings are employed. Tests indicate that the shaft is free from whip up to 3500 r.p.m. Counterbalances are welded solidly to the shaft and the finished shaft is put in both static and running balance. When the crankshaft is being balanced the oil holes of the shaft are filled with oil, and the oil pipes, which are curved on the cheeks of the crank, are in place. This means that the crankshaft is balanced under running conditions, and by this method it has been possible to eliminate perceptible periodic vibrations throughout the speed range of the engine. At the rear end of the crankshaft are three spiral grooves leading from the oil thrower, to turn back any oil which would otherwise tend to work out at this point.

Forward of the timing gear pinion is a helical gear which operates the two water pumps through a cross-shaft. To the forward end of the crankshaft is keyed a pulley which furnishes the drive for both the fan and the generator. The section of the crankshaft webs increases progressively from the pins to the axis of the shaft. The curved oil pipes secured to the webs carry the oil from No. 1 to No. 2 throw on one side of the shaft, and from No. 3 to No. 4 throw on the other side. This arrangement overcomes interference with oil flow due to centrifugal action and it also obviates the necessity for drilling the cheeks. The oil holes feeding the connecting rod bearings are drilled on the inside surfaces of the crankpins, so that the centrifugal force will cause the oil to pass over the entire surface of the bearing. It is claimed that when the oil hole is on the outside of the crankpin, the oil is whirled directly out of the bearing and into the cylinder bores, where it is picked up by the pistons and much of it needlessly burned or oxidized. This is said to be one of the factors tending toward oil economy in these engines.

The rear main bearing measures 2⅛ x 3 5/16 in., the front, 2⅛ x 2 27/32 in. The bearings are of the babbitt-



*Three-quarter rear view of powerplant*

lined, bronze back type, the specification for the lining metal being 90 to 92 per cent tin, 4 to 5 per cent antimony, 4 to 5 per cent copper, and 0.20 per cent maximum lead. The connecting rod bearings are 2⅛ in. in diameter by 2 11/32 in. in length.

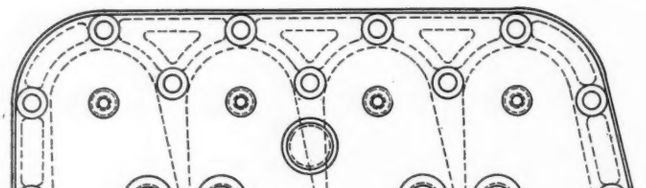
High tungsten steel is used for the exhaust valves and low tungsten for the inlet. These valves are tulip shaped, to reduce the resistance to gas flow. The valves have 1 7/16 in. diameter heads and 9/32 in. diameter stems. The clear diameter of opening is 1 9/32 in. Roller cam followers are fitted to the valve tappets. Each valve is operated by an independent cam, this being made possible by setting one block slightly forward of the other.

### Valve Details

The valve springs have ten live coils and exert against the cams when the valve is closed a pressure of 66 lb., which is sufficient to cause the valves to follow the cam contour at maximum speed. The valve springs are 63/64 in. outside diameter and are tested by compressing from a free length of 3¼ in. to a closed length of 1¾ in. The spring must allow of this compression without taking a permanent set. The valve spring is held in place by a retainer which rests on a split collar fitted into a recess on the valve stem. This collar is hardened to 90 points scleroscope and forms an efficient locking device. The valve tappets are 9/16 in. in diameter by 2⅝ in. in length and work in a guide which forms a bearing from the center line of the roller right to the end of the tappet. Nickel steel is the material used for the tappet, and it is heat-treated to 50 to 55 scleroscope.

The valve adjusting screw is ⅜ in. in diameter and is heat-treated to glass hardness. The cam roller is ¾ in. in diameter by ¼ in. wide and is hardened to 75 to 85 scleroscope. The pin on which this roller runs is driven into the valve tappet and is also hardened.

The camshaft, with its sixteen integral cams, is a very interesting drop forging. The cams are of the constant acceleration and deceleration type and have a base line



*Cylinder head*

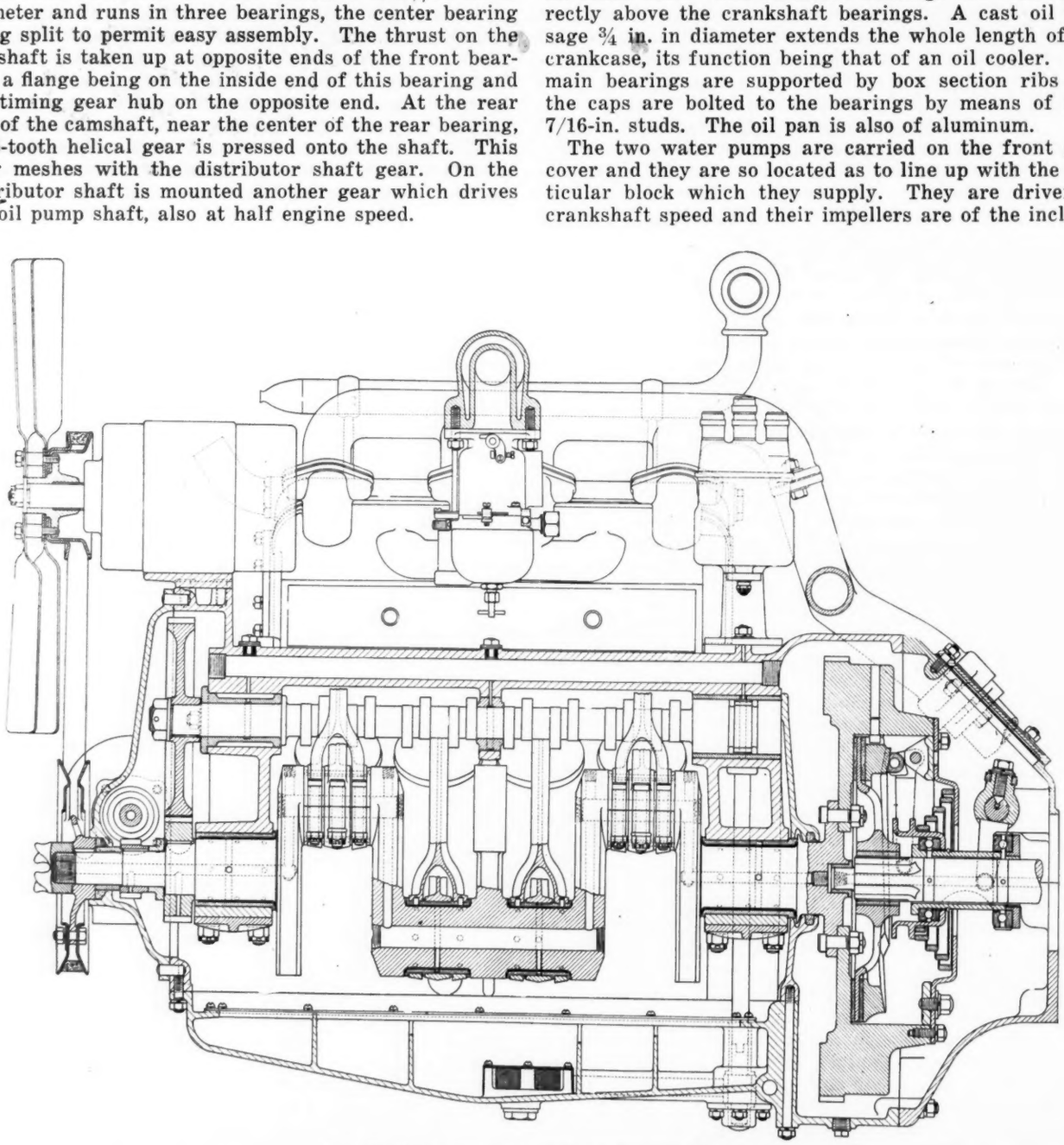
clearance of 0.006 in. on both exhaust and inlet. The lift of the cams is 0.2928 in. The camshaft is 1 1/16 in. in diameter and runs in three bearings, the center bearing being split to permit easy assembly. The thrust on the camshaft is taken up at opposite ends of the front bearing, a flange being on the inside end of this bearing and the timing gear hub on the opposite end. At the rear end of the camshaft, near the center of the rear bearing, a 15-tooth helical gear is pressed onto the shaft. This gear meshes with the distributor shaft gear. On the distributor shaft is mounted another gear which drives the oil pump shaft, also at half engine speed.

The timing of this engine is as follows: Inlet opens 4½ deg. after top dead center and closes 42 deg. after lower dead center; exhaust opens 45 deg. before lower and closes 3½ deg. after upper dead center.

The oil pump is located in the base of the oil pan and is of the conventional gear type. Both gears have eleven teeth, 10 pitch, and have a face 1 in. wide. These gears are straight spur type, whereas the driving gears are of the helical type and have fifteen teeth of 14 pitch with a 20 deg. angle. The timing gear on the crankshaft is of the helical type and has thirty-two teeth of 10 diam. pitch, with a 22 deg. 30 min. angle of helix. The timing gear, which is mounted on the camshaft, has sixty-four teeth.

The crankcase is made of aluminum, its sides extending down 4¼ in. below the center line of the crankshaft. These sides are ribbed and form a bridgework. The cylinder blocks are bolted to the crankcase by ten 7/16-in. studs each. The camshaft bearings are located directly above the crankshaft bearings. A cast oil passage ¾ in. in diameter extends the whole length of the crankcase, its function being that of an oil cooler. The main bearings are supported by box section ribs and the caps are bolted to the bearings by means of four 7/16-in. studs. The oil pan is also of aluminum.

The two water pumps are carried on the front gear cover and they are so located as to line up with the particular block which they supply. They are driven at crankshaft speed and their impellers are of the inclosed



*Longitudinal section through engine and clutch*

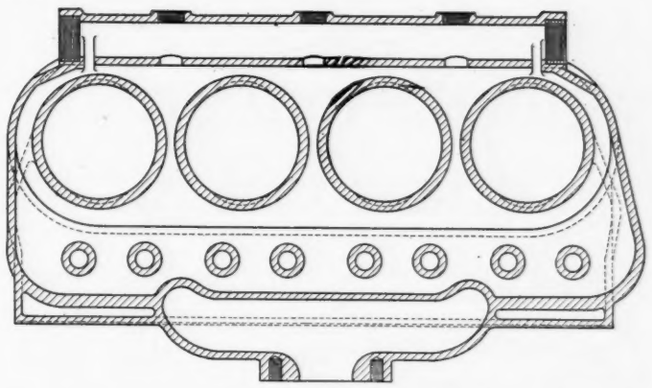
vane type which eliminate wall friction in the pumps.

Oiling is by pressure feed. The oil is first strained through a large, fine-mesh screen into the oil pan; from there it passes through the oil pump which is located in the base of the oil pan toward the rear, and is then delivered through a pipe in the bell housing to the top main oil-way cast in the crankcase. Here some of the oil branches off to the rear main bearing, while the main stream passes along the top of the crankcase and then down a drilled hole to the front main bearing. Here it enters the hollow crankshaft and flows along the center of the shaft and up through the web to No. 1 bearing. Thence it is carried through an arc-shaped pipe concentric with the crank axis to No. 2 bearing. At No. 2 bearing the smaller stream which comes in at the rear bearing is met. At the rear bearing there is a relief valve discharging to the crankcase. A small hole in the crankshaft supplies the front pump gears and timing gears with oil, and the rear camshaft bearing is similarly supplied from the top main oil channel.

The weight of the second unit power plant turned out in regular production is 714 lb. This includes the engine with generator, starter, carbureter, wires and header, fan, clutch, transmission, pedals, 5 qt. oil in motor and oil in transmission.

| | |
|---|---|
| Motor minus clutch and transmission weighs.. | 606 lb. |
| Transmission filled with oil weighs..... | 82 lb. |
| Borg & Beck clutch weighs..... | 26 lb. |
| Motor alone without oil weighs.....597½ | lb. |

The clutch used is a Borg & Beck 10-in. The gearset is of the selective type and has three speeds forward and one reverse. The second speed ratio is 1.736 to 1; the first speed, 3.525 to 1, and the reverse, 3.966 to 1, with a 4 2/3 to 1 reduction on the rear axle. The gears

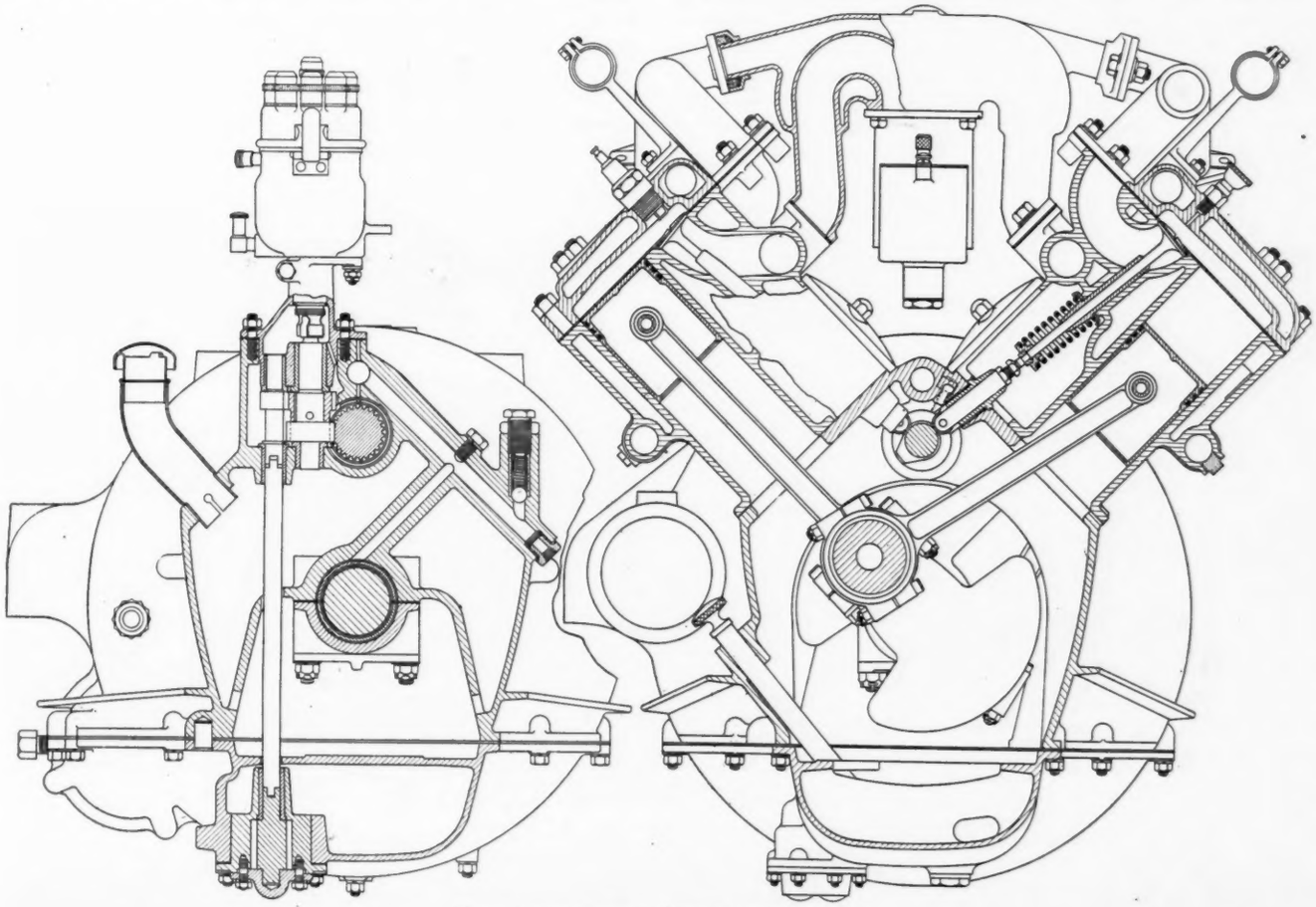


*Horizontal section through cylinder block, showing water inlets and inlet manifold*

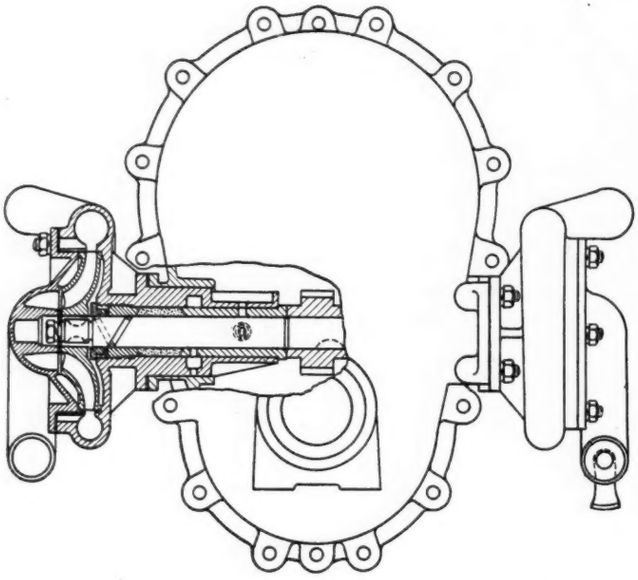
are of 6-8 pitch. The drive from the transmission is taken through a Spicer universal joint encased in a ball housing connected to the end of the torque tube.

The rear axle is of the three-quarter floating type and is of Oldsmobile design and manufacture. The axle pinion shaft is carried on ball bearings of liberal size. A Hyatt roller and a thrust bearing are fitted on both sides of the differential. The end bearings on this shaft are of the regular Hyatt type.

The front axle is of I section and the wheels are carried on radial ball bearings. The king-bolts are 1 in. diameter. There are oil cups on the king bolts and Alemite grease connections are fitted to the tie rod bolts. The front springs are 2 in. wide by 36 in. long and have 8 plates. The rear springs are semi-elliptic, underslung, 2¼ in. wide by 54 in. long and have 9 plates.



*Two transverse sections through engine*



*Assembly, gear cover, water pump and shaft*

Both front and rear springs are so designed as to be flat under the rated load of the car.

A split nut, semi-reversible type steering gear is fitted. The steering column, mounted on the left side, is nickel finished and rigidly braced to the instrument board. A corrugated walnut steering wheel is used, the diameter being 18 in.

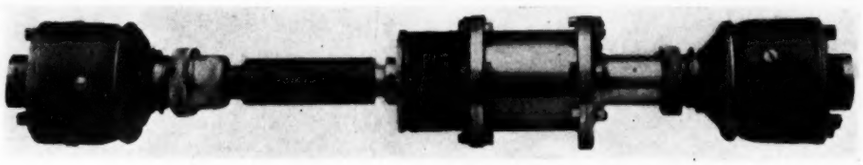
The seats on the "Pacemaker" four-passenger are amply wide. The dimensions of the front cushions are as follows: Depth, 18½ in.; width, 38 in.; thickness, 5½ in. rear and 6½ in. front. The rear cushion has a depth of 19½ in.; width, 40 in.; thickness, 8 in. front and 6 in. rear. These cushions have the conventional springs and are covered with fine grained, bright finish, black leather, French plaited. They are stuffed with a No. 1 4-oz. cotton batt. The upholstery on the rear seat back is about 9 in. deep, and on the front about 6 in. The cushions are kept in place by smoothly finished, black enameled, round edged retainers.

All open cars will be fitted with straight side 32 by 4-in. tires, the rear tires being nonskid, while on the closed cars 32 by 4-in. cord tires are used. The weights of the four-passenger car with 14 gal. of gasoline, 1½ gal. of oil, water and one spare cord tire is 2970 lb., of which 1360 lb. is at the front and 1605 at the rear.

# A Shock Compensator for Shaft Drives

A SHOCK compensator designed by Richard T. Cooke, for insertion in the propeller shaft, to relieve the shocks coming on the mechanism of an automobile or motor truck when the clutch takes hold too rapidly, is to be manufactured by the Hartford Automotive Parts Co. The device consists of a cylinder filled with oil, in which there is a shaft having two paddles or vanes formed integral with it. There are also within the cylinder two partition walls dividing the cylindrical chamber into two compartments. There are two passages in each of these partitions, one a very restricted one through which the oil can flow in both directions, but only at a comparatively slow rate; the other controlled by a check valve, so that oil can flow through it only in one direction, but quite rapidly. The paddle shaft is the driving member and the housing the driven member.

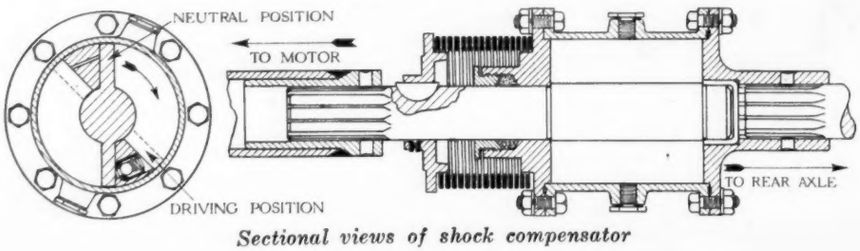
When the clutch is disengaged a coiled spring between the housing and the flange on the driving shaft keeps the paddle and the housing in the relative position indicated by "neutral position" in the cross sectional view, there being then no torque transmitted through the device. When power is applied by letting in the clutch, the torsional force of the spring will be overcome and the oil will be forced through the fine passage from one compartment of the housing to the other, thus causing the paddle shaft and housing to gradually assume the relative position indicated in the drawing by "driving position." The action is similar to that of a door check. Angular motion of about three-eighths of a turn in the propeller shaft, or from three-eighths to two turns of the engine, depending upon the gear reduction in the transmission, occurs before the drive is positive. During this period a marked cushioning effect is said to take place. A device of this kind should prove particularly valuable on heavy motor trucks, owing to the great inertia of the mass to be accelerated when changing to a higher speed. The device is said to prevent axle and other driving part breakage due to sudden application of power. It is claimed that the flexibility provided in the drive by the device makes gear changing, as in traffic, much less frequent and that, when desired, even a truck of medium weight can be started in second or third gear without undue clutch slippage.



*Assembly of compensator, propeller shaft and universal joints*

A fluid, the viscosity of which does not change to any great extent with ordinary changes in atmospheric temperature, can be used in the compensator if desired. While the fluid chamber is so packed as to prevent leakage of the damping fluid, even the loss of all the fluid will not prevent operation of the car, though in that case the cushioning effect, except for that due to return spring, will be lost.

It will be seen from the cut that the shaft is well supported in long bearings in the flanged ends of the cylindrical casing so that transverse play is inappreciable. By this means the possibility of the assembly running out of true is virtually eliminated.




*Sectional views of shock compensator*

# British Light Car Becoming Increasingly Popular Because of Its Economy

**The high grade four seater with an engine of about 100 cu. in. displacement selling at about $3,000 is now recognized as a permanent and practical type—one making a wider appeal to British buyers than any other type. First cost less important than economy. Owners soon learn to change gear frequently and almost unconsciously.**

By M. W. Bourdon

SINCE the Olympia Show of 1919 the light car in Great Britain has developed very appreciably. It is no longer only a two-seated runabout with an engine of about 60-70 cu. in. displacement, but has become also a practical four-passenger vehicle with an engine of 90-100 cu. in. The two-seater is still very popular, but its limitations in certain directions have been eliminated and only in a few instances has it the cramped accommodation of a year ago.

As it is growing in chassis and engine dimensions so is the light car increasing in popularity and scope. It is generally admitted that the feature of the recent London Show was the light four-seated car, and it is safe to say that no British maker of this type having a standing in the industry is other than satisfied with prospects for 1921. There were approximately 50 firms exhibiting light cars of various sizes, but the type which is making the widest appeal is restricted to about half that number.

It is very difficult to generalize on the technical side of the light car, for the range of the type is so wide. That is to say, the term "light car" is very indefinite and is applied simultaneously to the four-seater weighing 1800 to 2200 lb. and to miniature two-seaters with motor cycle practice written all over them. The latter are cycle cars in all respects except name. Between these two extremes there are the two-cylinder horizontally opposed or Vee air-cooled two-seaters of about 8 hp. Of this section there probably is none so good or at all events so popular as the little Rover at anything like the price ($800); it was at one time turned out as fast as the makers could get bodies built, about 40 per week.

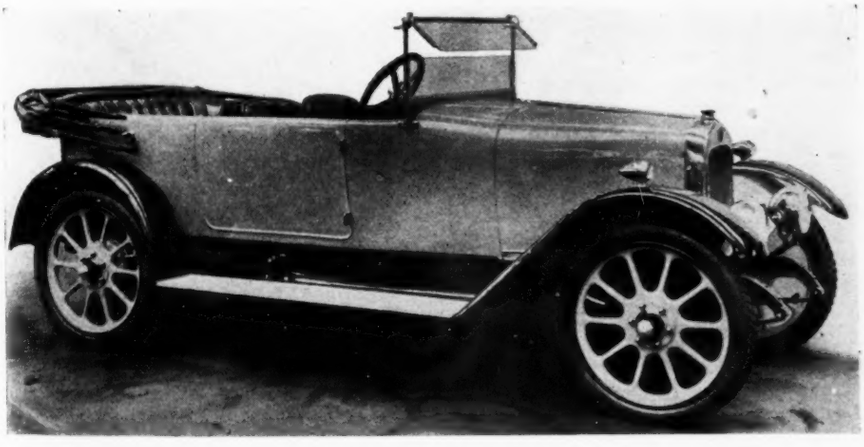
Next comes the section with four-cylinder water-cooled engines of 60-70 cu. in. capacity, the original of the general type. In this class are the 10-hp. Wolseley, Singer Calthorpe, A. C., and others which have or have not yet established their reputations. Finally, there is the section with which this article is primarily concerned. It is usually looked upon as a new type, but actually it was represented even in 1914 by the 10-hp. Humber with an engine capacity of approximately 100 cu. in.

It is in this last section where development is most observed. After being looked upon as an overgrown and overloaded miniature car, it is now recognized as a permanent and practical type and as one making a wider appeal to buyers than any other size of car.

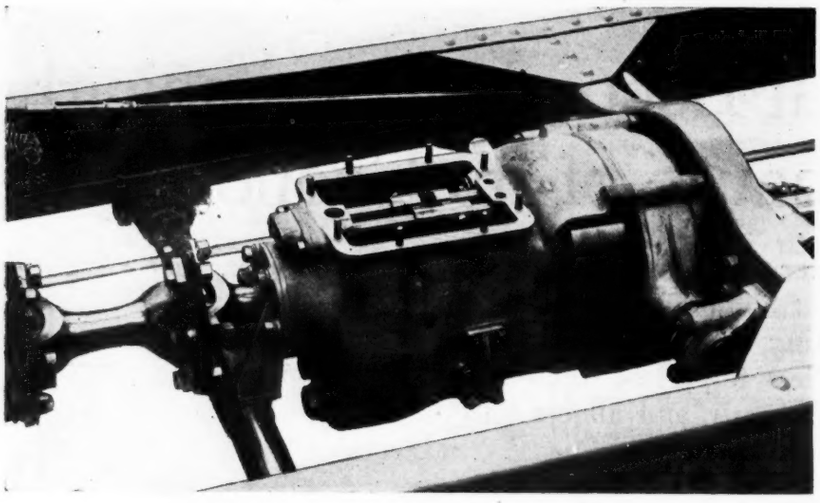
The light four-seater is a term which better describes it than "light car," for although the chassis is quite as often fitted with a "two-seated" body the latter generally has accommodation for two extra passengers in a more or less roomy folding rear seat. At all events, the chassis is designed to carry four passengers, which the original and still existing light car chassis was not.

A general idea of the type in question can be obtained from a knowledge of the engineering details of two of the best examples, wherein design varies widely without affecting the result in performance. These two are the new 12-hp. Standard and the small (so-called 10-hp.) Humber. There is little to choose between them.

The 12-hp. Standard has a four-cylinder 68 x 110 mm. (2 11/16 x 4 5/16 in., 97.5 cu. in.) overhead valve engine with push rod operation; detachable head; block cast cylinders mounted on an aluminum crankcase; thermo-syphon water circulation; magneto ignition; hollow shaft lubrication carried up to the wrist pins and valve rocker shaft; dry single disc clutch; separate three-speed gear-set with right-handed control lever; open propeller shaft with fabric disc joints; overhead worm gear, 3.83 to 1 ratio; 32 x 3½ in. tires on all-metal hollow spoked wheels and brakes on transmission and wheel drums. The wheelbase is 108 in., track 48 in. and weight 2000 lb. Electric lighting and starter are fitted and with four-passenger body it sells at $3,200.



*Enfield Allday, a good example of the British light four-seater. The four-cylinder engine has 2½-in. bore and 4⅝-in. stroke. The transmission is a separate unit. One wide door on each side affords access to either front or rear seats, the former having folding backs and being hinged to tilt forward.*



*The Enfield Allday three-speed gearset has three-point suspension and is extended at the rear to enclose an expanding transmission brake. Two flexible disc couplings are used between clutch and gearbox*

The Humber has a unit power plant with a four-cylinder block cast detachable L head engine, 65 x 120 mm. (2.56 x 4.73) or 97.2 cu. in. displacement. The cylinder block is cast as a unit with the top half of the crankcase. Trough and splash lubrication, magneto ignition and thermo-syphon water circulation are used. The inverted cone clutch is enclosed, leather-faced and has provision for running in oil. The gear-set has four speeds with the control lever on the right; open propeller shaft with disk and sliding block joints; straight bevel gear 4.33 to 1, 34 x 3½ in. tires on hollow spoke wheels; transmission and wheel brakes, a wheelbase of 106 in., a track of 55 in. and weighs 2200 lb. With full electric equipment and four-passenger body it sells at $3,400.

Another example is the 10-hp. Wolseley, but this is usually fitted with a two-seated body, though a standard model is a four-seater with a narrow (34-in.) rear seat, wide enough for two small-sized adults or two children; it hardly comes into the Standard and Humber class, having a smaller engine (2 9/16 x 3¾ in., approximately 76.8 cu. in.) and is very much overloaded with four full-sized passengers. Nevertheless, it makes a big appeal at $2,600 in the two-seater model, for with its overhead camshaft the engine efficiency is fairly high. The three-speed gear-set is on the back axle, which embodies worm drive with a ratio of 5.1 to 1. It is one of the best if not the best sprung of its class, having quarter elliptic springs fore and aft, as against the semi-elliptics all around on the Standard and Humber.

From the prices quoted it will be realized that these are not cheap cars as regards first cost. They are very well finished mechanically and otherwise.

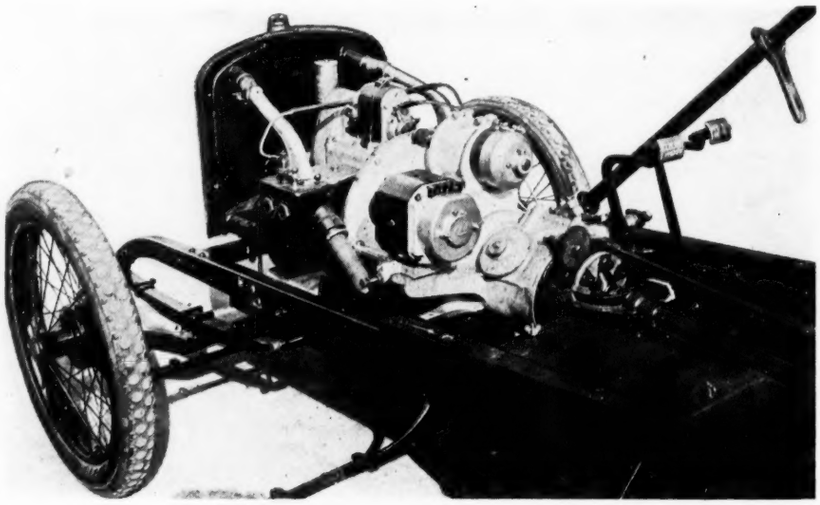
Where the light four-seater makes its appeal is in respect of economy in running, ease of maneuvre and "handiness." It runs on an average 29 to 33 miles to the gallon of fuel, when driven at moderate speeds. On high gear and level roads it has a maximum speed in the neighborhood of 50 m.p.h. Oil is 1500 to 2000 miles per gallon and the average life of a set of tires is 10,000 to 12,000 miles.

The engine efficiency is fairly high. The normal speed of rotation is 2000 to 2200 r.p.m., but speeds higher than that, in some cases 3000 r.p.m. and over, are reached and maintained — on the lower gears especially—for quite long periods at full throttle. They are unquestionably high-speed engines, and the power falls off rapidly below 1300-1400 r.p.m. As a result, the gear shift is frequently in use and this as much as anything accounts for their fuel efficiency without detracting seriously from the approval of users.

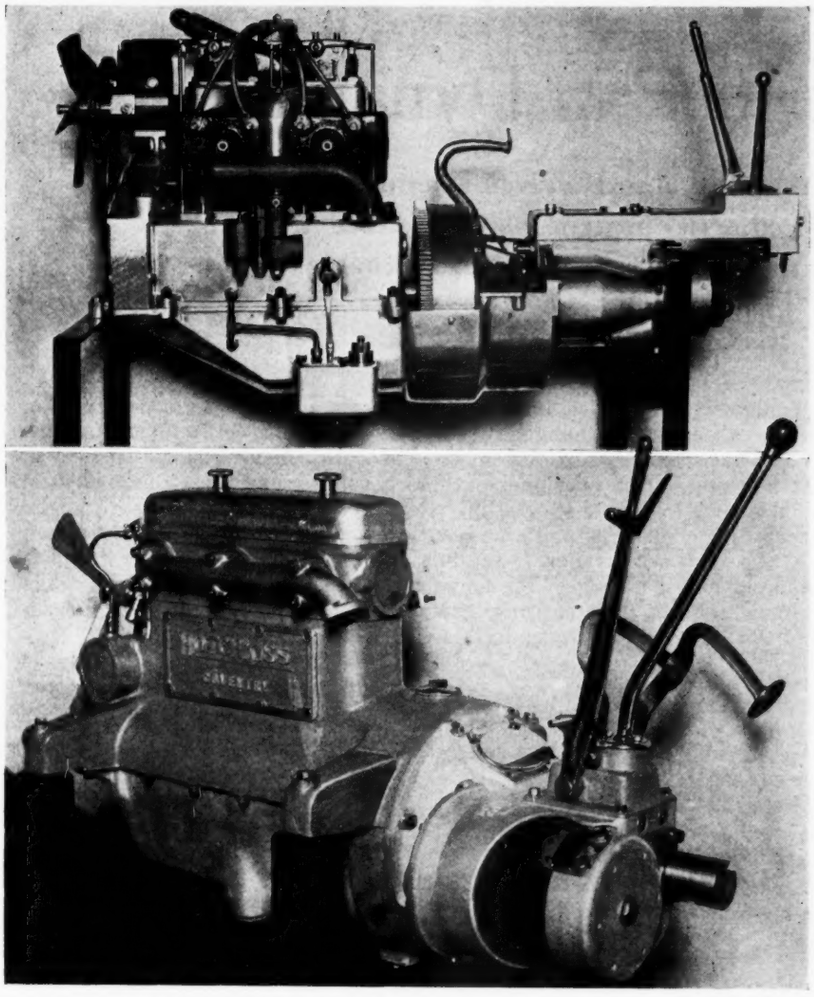
It must not be assumed that this type of car is appealing only to those buyers who are men, or women, of strictly limited means, though these were the class of people for whom it was originally designed. The light four-seater, with either a tonneau or a folding rear seat for two of the passengers, is being bought in increasing numbers by people of social and financial standing, who have been hard hit by the excessive income tax and cost of living generally. As they are reducing their domestic staffs, so they are turning to far smaller cars than those with which they at one time would have been satisfied. They are people who in 1914 would have derided any neighbor who rode in a car of less than 25 to 30 hp.; yet now they take pride in the running and appearance of their little 10 or 12-hp. four-seaters.

Even if this class of man does not buy a small car for constant or sole use, he probably very considerably restricts the mileage of his larger car (which quite possibly is a Rolls-Royce) and uses the small one for short journeys for economy's sake. His wife and daughter actually prefer the light car for driving themselves; they find it handier and easier to drive than a large one and quite large and presentable enough for shopping and social calls.

But the small car makes an even more forcible appeal to the man of no particular social standing and of somewhat limited means. He uses it quite successfully for touring and week-end runs. He can carry 3 friends with light luggage and cover 200-250 miles per day at an average speed of 20 to 22 m.p.h. exclusive of stops. The car will climb any hill on low gear; does not overheat; and with its well-upholstered and well-finished body is almost as comfortable as the 30-hp. six-cylinder car. The shorter



*The unit powerplant of one of the lighter type cars built by the manufacturer of the Douglas motorcycle. The double opposed engine is only 3⅝ by 3⅝ in. but has electric starting and lighting generator and magneto ignition*



*Above—The Lagonda four-cylinder 2¾ by 3¾ in. engine is one of the few British engines with superimposed valves. Note construction of unit powerplant with open top casing for flywheel and clutch*

*Below—The English Hotchkiss powerplant, used by at least one British light car manufacturer. Note method of mounting the starting motor*

wheelbase and the lighter weight do not enable the car to run as smoothly on rough roads as a bigger car *if the same average speeds are attempted.* If the road speed is reduced proportionately to the car size there is very little to choose between one and the other.

But the majority of buyers of the light four-seater want a well-finished car, and do not mind paying a comparatively high initial price so long as it runs economically, quietly and without pronounced engine vibration. They would prefer, no doubt, to run more on high, but they have no great objection to changing gear. They soon find that they are compelled to use the gear shift very frequently; they dislike it at first, but within a month they change gear almost as unconsciously as they operate the accelerator; and usually with similar quietude.

An original drawback to these little cars was their susceptibility to carbon deposit; they have quite a reasonable compression—from 70 to 80 lb. per square inch when new—and yet they were at one time prone to "pink" badly after quite a small mileage. But this fault has been overcome to a large extent by the experienced makers by the use of scraper rings and less haphazard lubrication, and these cars will now run 3000 to 4000 miles without decarbonizing. Local overheating was another cause of trouble. Running as they do for long periods at high rates of speed with full or nearly full throttle, the spark plug points are liable to become incandescent and cause preignition and back-firing. The plug boss in the cylinder must therefore be in fairly intimate contact with the cooling water and care is essential to eliminate pockets in the water jackets where steam can generate. On the new Standard this pocketing has been overcome by a subsidiary water outlet (with an internal diameter of ½ in.), from the front end of the head to the radiator, the main outlet being at the side of the head. The detachable L-head design is quite satisfactory in these small sizes, and the spark plug difficulty has not occurred in this type. Where it has been most pronounced is in cyclinders in which the plug screws into a valve cap. Failing other remedies the plug adopted is made with external radiating fins and very heavy electrodes—what is sold as a "racing" plug.

Another original difficulty was due to rapid wear of crankshaft journals and big-ends. Hollow shaft lubrication has been adopted with some success in eliminating these troubles, and, although troughs for the big ends have frequently been retained, direct leads are now nearly always taken to the journals. Two-bearing crankshafts are normal, as are light cast iron pistons and H-section connecting rods. Obviously the balancing of reciprocating or rotating parts is an important consideration, though counter-weighted crankshafts are not used.

Generally speaking, the developed type is a high grade car in miniature, though, as may be expected, there are not a few examples of poor design, bad workmanship and unsuitable materials among the chassis and bodies turned out by small firms trying to make their own components—as the majority of them do.

It must be said that there are no dividing lines between the true light car (with 60-70 cu. in. engine), the light four seater (90-100 cu. in.) and the next size above. The latter comprises the Bean (110 cu. in.) and others of similar size; but they are accounted out of the light car class, although termed 12 hp. The four-cylinder Rover is also rated at 12 hp. with an engine capacity of 136 cu. in., but both it and the Bean are a heavier type of car, although in seating capacity there is little to choose between them and the 10 hp. Humber. Further, the Bean sells at $2,700 as against the Humber $3,400; but the better finish of the latter has enabled its makers to be fairly well assured of a market.

It is to be noted that British makers have by no means a monopoly in the type of chassis under discussion. Fiat, Citroen, Peugeot, and other Continental plants are turning out chassis for light four-seated bodies of similar size and selling them at approximately the same price in England as British cars, the import duty being counteracted by the rate of exchange between Italy or France and England. The Fiat model has an engine of 65 x 110 mm. (approximately 89 cu. in.). It need hardly be said that these also are high-grade cars in miniature; they have the same characteristics as to engine speed, weight, and gear ratios as the British productions, but at present the latter are not feeling this foreign competition.

There are indications that the development of the type is not yet complete, and one of the best known makers has

(*Continued on page* 651)

# A Variable Speed Fan Dynamometer

**The ordinary type of fan brake will absorb a given amount of power only when running at a fixed speed. In the type here described the fan is inclosed and load can be varied by changing area of discharge opening.**

By Karl D. Wood*

FAN brakes are widely used as absorption dynamometers in testing internal-combustion engines because they are comparatively simple, inexpensive and flexible. They have, however, the disadvantage that a given fan will run at only one speed when the engine is delivering full power, that speed being determined by the size, proportions and environment of the fan and the density of the air. In order to be able to vary the speed at which a given power will be absorbed, English manufacturers have for some time been using a cylindrical housing around the fan with one or two variable openings in the periphery. They are not known, however, to have published any information showing the range of speed control available. Hence, these experiments were undertaken with a view to answering the following two questions:

(1) What range of speed control is obtainable with a fan brake?

(2) Given the rated horsepower and speed of an engine, what is the diameter of fan brake necessary in order to obtain complete tests of power vs. speed?

The general procedure of the experimental work was to mount a two-bladed paddle-wheel fan on a small electric dynamometer, build a cylindrical housing around it, the inlet and outlet of which were of controllable area, and measure simultaneous values of speed and horsepower with different sizes of inlet and outlet. This gave sufficient data to determine the speed and power ratios obtainable by opening and closing the outlet, and the size of inlet for maximum speed control.

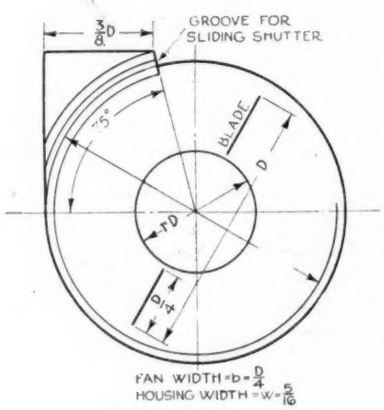



*Fig. 1—Section through fan blades*

The fan consisted of two square pieces of ⅛-in. sheet aluminum about 11 in. on each side, bolted to a steel arm ⅜ x 3 in. by means of steel angles. The diameter of the fan measured from tip to tip of the blades (the nominal diameter) was 44 in. The proportions of the fan brake are shown in Fig. 1, which is a section through the fan blades looking toward the inlet end of the brake. The two ends of the housing were sawed out of slabs of cleated tongue and groove pine and an 18-in. strip of galvanized iron nailed around the periphery of the ends completed the fan brake except for the sliding shutter. The estimated maximum cost of such a fan brake in January, 1920, labor included, is $25.00.

The fan brake was mounted on a 50-hp. Sprague electric dynamometer. Data for horsepower-speed curves were taken with inlet diameters of 26, 20 and 16 in. respectively and with inlet closed, the circumferential outlet opening being changed by steps of 2 in. up to 30 in. open for each setting of the inlet. The outlet uncovered about 75 deg. of the periphery of the housing when the circumferential opening was 30 in. Readings of static air pressure in the housing and air velocity through the outlet were also taken with a view to establishing a reasonable basis for the computation of the horsepower necessary to drive a fan brake of different proportions from the one tested, but no satisfactory formulas were obtained.

Fig. 2 shows the horsepower-speed curves for the fan brake tested, plotted on the same sheet with a horsepower-speed curve of the fan in free air and curves of three well-known engines. The observed points are shown in circles and dotted lines indicate extrapolation. The slope of the lines is 3.0; this differs from some other observers' results by as much as 0.1. The horizontal distance between curves *B* and *C*, measured with a logarithmic scale, is the speed ratio of the fan brake. For the brake tested the speed ratio was 1.7. The horizontal distance between curves *A* and *C* gives the maximum speed ratio that could be obtained by any improvements in the design of the fan brake. It will be noticed that *A* cuts the 1000 r.p.m. line about the same horsepower that *C* cuts the 2000 r.p.m. line, so the maximum speed ratio obtainable is 2 to 1. The vertical distance between the two lines gives the power ratio of the fan brake, and is naturally the cube of the speed ratio, or 5 to 1. Since the lines are parallel, the speed ratio is independent of the speed at which the fan is run. This means, of course, that the *speed* range is greater at higher speeds. At 300 hp. a speed range of 1600 r.p.m. is available, which is more than enough to take a complete full-throttle run on a 300-hp. Hispano-Suiza engine. At 18 hp. speed a range of only 650 r.p.m. is available, and this is not quite as great a speed range as is usually required in running tests on Ford engines. Curve *D* is a typical full-throttle Ford engine curve. While the characteristics of a fan brake give it greater speed range at high speed than at low, it must be very carefully built in order to be run with safety at speeds over 1500 r.p.m. Fig. 3 shows in full lines the curves of horsepower at 1000 r.p.m. against fan diameter for Sturtevant Steel Plate blowers plotted from data given in their catalog No. 234. These curves indicate that for fans of different diameter having other dimensions proportional to the diameters, the power absorbed by the fan varies about as the fifth power of the diameter, since the slopes of the curves are 5.3 and 5.1 respectively. The fact that the lines for Sturtevant blowers open and closed are parallel shows that the speed

*Technical note prepared under the supervision of the Automotive Power Plant Section of the Bureau of Standards, and submitted through the Subcommittee on Power Plants for Aircraft to the National Advisory Committee for Aeronautics for publication condensed.

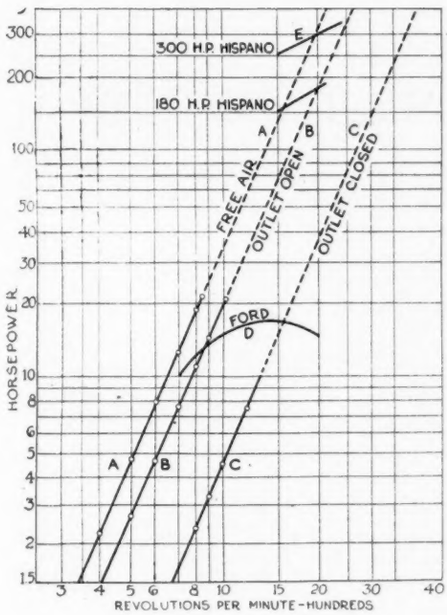



*Fig. 2*

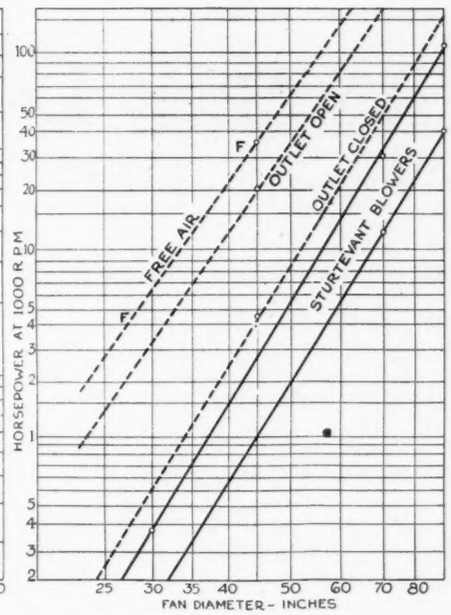



*Fig. 3*

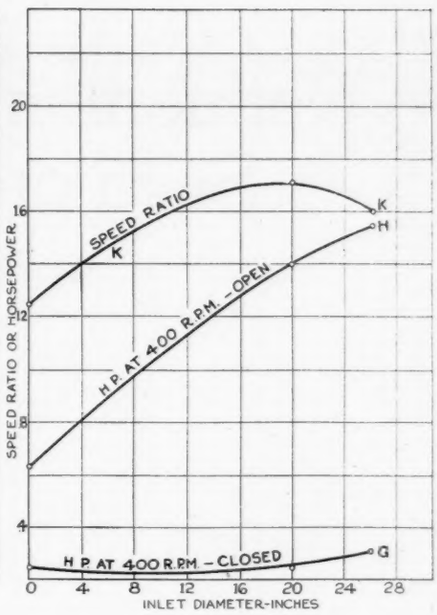



*Fig. 4*

and power ratios are independent of size of fan, and it is assumed for the purposes of this work that this is also true for fan brakes. The dotted lines are for the type of fan brake shown in Fig. 1. Each is drawn through one observed point with a slope of 5 to 1. They can be used to determine the size of fan required to run a test on a given engine provided an approximate horsepower-speed curve for the engine is known, but a fan built with the nominal diameter indicated on the curve may absorb as much as 10 per cent *more* or 10 per cent *less* power than indicated on the curve.

Fig. 4 shows how the diameter of the inlet affects the power absorbed by the fan and the speed ratio. Curve *H* shows that the power absorbed by the fan with outlet open varies almost directly as the inlet diameter, and curve *G* shows that the power absorbed with the outlet closed remains constant until the inlet diameter becomes greater than the inside diameter of the blades, when it increases. The ratio of any two ordinates on the curve gives the power ratio, which is the cube of the speed ratio, and the speed ratio is plotted as curve *K* to the same numerical scale as the horsepower curves. Curve *K* shows that if the diameter of inlet is $rD$ (where $D$ is fan diameter), the best value for $r$ is about ½, which makes the inlet diameter just equal to the inside diameter of the fan blades. It might be possible to get a greater speed ratio if the blades were made oblong instead of square, with the axial length greater than the radial depth.

The conclusions of this investigation are, briefly:

(1) A fan brake can be made to give a power ratio of 5 to 1 or speed ratio of 1.7 to 1, by means of a variable shuttered housing.

(2) Performance of a fan brake of the same proportions as the one tested but of different diameter can be predetermined within about 20 per cent (i. e., ± 10 per cent from nominal) by means of the curves given. For accurate work a means of measuring torque must be used in conjunction with the fan brake.

# British Light Car Movement Extending

(*Continued from page* 649)

confided to the writer his intention to add another 10 cubic inches or so to the capacity of his engine (now just under 100 cu. in.) without varying the chassis or price. This may reduce fuel economy, other things being equal, but it will improve high gear performance and make the chassis less overloaded when fitted with a sedan body—for which quite an appreciable number of buyers are asking, but, again, of high-grade.

Then, Morris, who has a good name and one of the biggest outputs of light cars in England, has put out a six-cylinder engine of the same bore and stroke as his four-cylinder model (2¾ x 4 in.) which, incidentally, has the unit power plant made by the English Hotchkiss Co. But this six-cylinder engine is only a "feeler" in an endeavor to sound the market to find out whether there is likely to be a sale for a super-grade light car.

The writer considers it is doubtful. His opinion is that buyers generally do not want anything bigger than 110 cu. in. for a larger capacity would diminish the economy feature and bring the car into another class altogether.

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DURING the war the production of aluminum developed enormously, and many things which formerly were made of other metals are now made of aluminum. At the same time the processes of production have been materially improved. According to the German periodical *Prometheus*, 176,200 tons were produced in 1917, as compared with 84,800 tons in 1914. The United States led with 90,700 tons, followed by France (20,000 tons), Norway, Switzerland and Canada. Germany is compelled to import most of her aluminum or to produce it from foreign bauxites. During the war the German consumption rose from 10,000 to 40,000 tons, and in the near future it will probably reach 70,000 tons.

# Refinements in Body Design to Be Seen on Many 1921 Models

**Even the moderate priced closed cars use materials equal to those employed in the more expensive cars, this being necessary to insure durability. Still much to be desired in the matter of comfortable seating. Higher backs with better contour will add to comfort of users.**

By George J. Mercer

CLOSED cars are quite uniform this year in the matter of interior design, appointments and material. Dealers who supply fabrics say that manufacturers of very moderate priced cars use materials for trimming that are the equal of those used in the more expensive cars. The reason for this is that a car must not only look well when new, but it must look well after service. Consequently the cheaper cotton velours that were used during the past year when materials were hard to obtain, have on account of their poor wearing quality been discarded. They have, however, temporarily hurt the sale of the mohairs, because while they look like them they do not wear the same, and besides there are more cars with a fine grade of wool fabric having a semi-smooth finish for trimming than usual.

It is a fact that real service and comfort have not in the past been such important elements in connection with body parts as they have become of late. Interior appointments such as lights, door and regulator handles and vanity cases must of course be uniform in design. The buyer may not have the requisite knowledge to understand cloth fabrics and painting, but if he is to remain sold, the cloth must not show a mark each time it is sat upon and the paint must not lose its luster in a short time.

There is still much to be desired in regard to comfort in seating and this will come in time. It can only be gained by having the cushion and back fit the human anatomy. The average cushion is generally most to blame in its relation to the height of the seat side. As a rule the springs are fairly good, but the backs are not comfortable on most open cars and the front seat back on closed cars is seldom right.

We have had a long era of the plain pleat. This type is readily adapted to quantity work and is easily kept clean, but too often the shape is a rounded contour from top to cushion, whereas a decided improvement would result if one row of buttons were placed at the height of the shoulders. This would draw the trimming in at that point and hold the bulge out below to fit the back below the shoulders. Providing there is sufficient slope to the back, the appearance made in this way appeals to the eye as being right. It is actually more comfortable in service. Sufficient height is also necessary in the case of the front seats of both open and closed bodies. This height is not sufficient for comfort in many cases, but it is not easy to gain more height as bodies are now designed. The rear seat can and should be 20 to 21 in. above the cushion, measured along a line parallel to the back from the cushion before it is depressed.

As will be seen from the accompanying photographs, mohair trimming is used for the Cadillac coupe, a conspicuous pattern being employed on the seats and plain material above. The LaFayette has a very inconspicuous pattern and plain material for sides and roof. The Cadillac coupe uses arm rails on the folding seat. The LaFayette limousine has an enclosure for the folding seats with locker space above.

In the Locomobile limousine the doors are paneled with carpet at the bottom. On all closed bodies the doors are without pockets. On this body arm holders are used. There are two dome lights and no corner light. The tendency to increase the power of the dome light and dispense with corner lights is growing.

The Packard sedan is also a cloth trimmed body, but leather covering is used on the driver's seat. The back of this seat is higher than usual and more comfortable looking. The doors are plain and there is one dome light.

The Pierce cabriolet is a good example of a high class town car and is trimmed in broadcloth. In the Lincoln limousine cloth trimming is employed and the doors have carpet at the lower edge. The folding seats are of the flush floor type.

The Lincoln touring body is a good example of comfortable seating arrangement. The backs are high and well sloped and the cushions low and well proportioned.

The radiators of the LaFayette and the Lincoln are good examples of the tendency to abandon straight lines for the inner contour of the shell. Practically all the new radiators have departed from the old practice of using a straight line at the top, and now that the tendency also is to have rounded lines on the outer contour, the new inner lines are in keeping and a pleasing contrast to the style just passing out where the use of straight angular lines was somewhat overdone.

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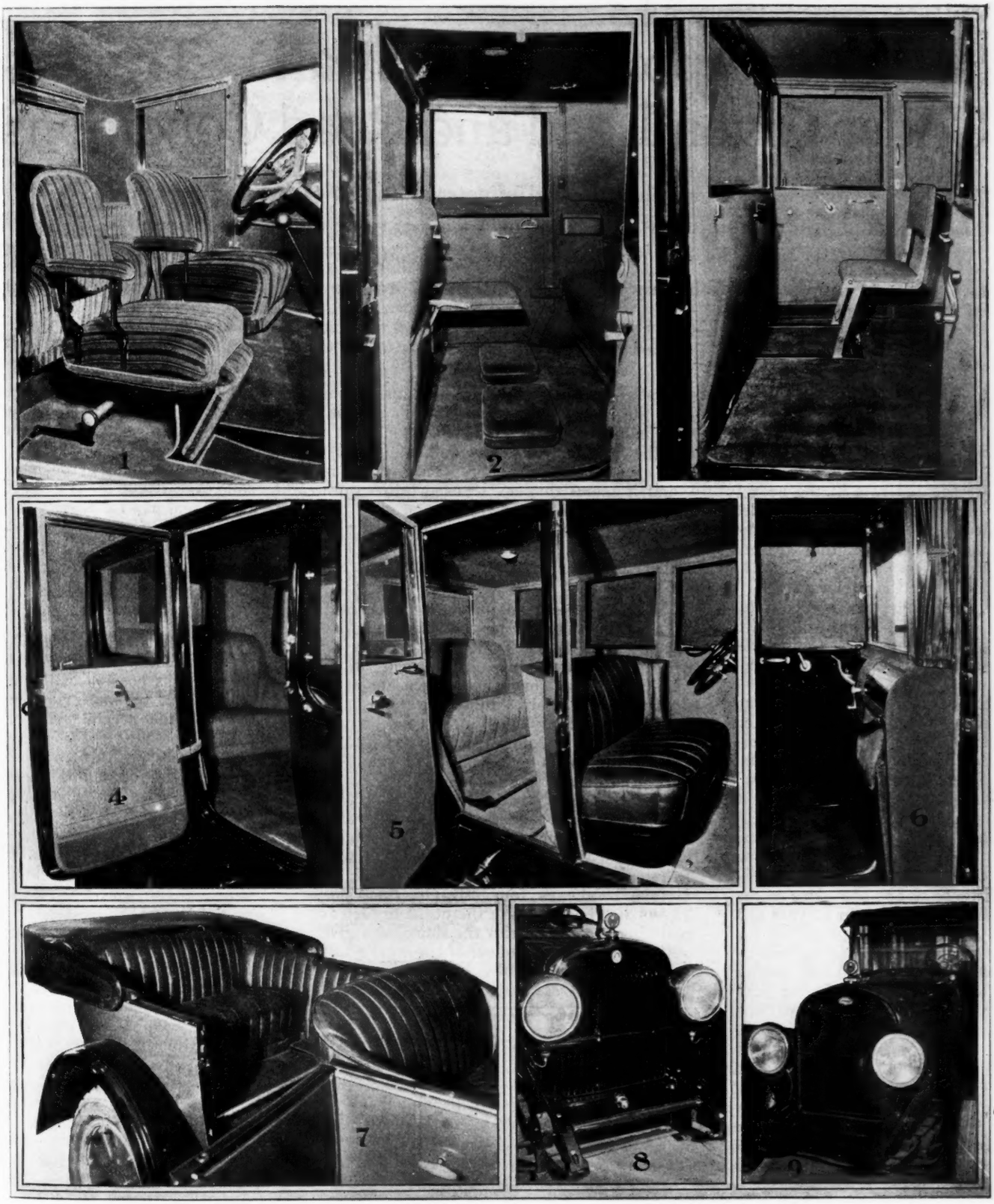
THE Midvale Steel Co. had an educational exhibit at the recent Columbus Tractor show intended to convince the tractor engineer that it pays to use rolled gear blanks in tractors in preference to cast iron blanks. A standard cast iron gear was shown on which a weight of 200 lb. had been dropped from a height of 6 ft., the gear being broken into four pieces by the first blow. A rolled steel gear subjected to the same test showed no serious effect after 20 blows. Gears were also shown out of which teeth had been broken in a testing machine and the force necessary to break the teeth measured. Two teeth in the cast iron gear had broken under pressures of 7515 and 5360 lb. respectively. With rolled steel gears without any special treatment it took 32,000 to 34,000 lb. to bend the teeth over. The teeth of the heat-treated gear required pressures of 40,000 to 42,000 lb. to break them.




(1) *Interior of Cadillac coupe. Mohair trimmings are used, that on the seats having a pronounced stripe, while the other trimming is plain. The folding seat has folding arm rails.* (2) *Interior view of Pierce-Arrow cabriolet, trimmed in broadcloth.* (3) *The folding seats used in the Lincoln limousine are of the flush floor type.* (4) *On the Locomobile limousine a panel of carpet is fitted at the bottom of the door.* (5) *Packard sedan has leather covering on driver's seat, but other interior trim is cloth.* (6) *The Lafayette limousine is provided with lockers above the space into which the folding seats disappear.* (7) *The Lincoln touring body has high, well sloped seat backs which, together with low, well proportioned cushions, make for comfortable seating.* (8 and 9) *The Lincoln and Lafayette radiator shells are good examples of the practice now becoming popular of using curved inner as well as curved outer contour lines.*

# How to Apply Trucks and Trailers Under Given Load and Road Conditions

**Explanation of graphical method of determining how much a given truck and trailer equipment can haul over a given route under various conditions as to grades and road surfaces to be encountered. Method can also be applied in selecting the best equipment to meet given conditions.**

By Marius C. Krarup

WHILE trailers and semi-trailers are being employed in increasing measure, the large appropriations now made for road improvements in many States make it probable that the use of these auxiliaries in transportation will leap ahead at an unprecedented rate in the near future, and it seems that a development of this nature, provided it proves itself justified, may cast into the shadow, by its sheer economical importance, any other feature in the evolution of motive power for the highways.

According to recent statements by the Good Roads Board of the American Automobile Association, expenditures totalling more than one billion dollars for road building and maintenance in the United States have now been authorized, and out of this vast sum of real American money $550,000,000 will probably be spent during the current year of 1921. Practically the appropriations of four years are available for 1921 and 1922, as so far very little work has been done on the basis of bond issues of 1918 and 1919, owing to high prices for materials and labor as well as shortage in the flatcar rolling stock required for hauling road materials to their destinations by rail.

Figuring the cost as high as $10,000 per mile, which is the maximum allowed in California, for example, there is thus an immediate prospect of having 10,000 additional miles of highly improved highways in the United States within a few years. A vast amount of hauling is done over existing roads, done at whatever cost, because necessary in the ever expanding work of upbuilding and cementing the material elements of civilization in a resistlessly prospering country where all backward waves are of short duration. But this work is done in streaks. It is estimated in Illinois that in that State about 90 per cent of the hauling is done over 10 per cent of the improved roads, and those the roads so well improved and located that motor trucks and trailers can be operated over them with maximum profits without question. So great is the competitive economical pressure in the price of hauling that the march of enterprise and improvements naturally follows the lines of smallest transportation cost. The figures may be rough, but the reasoning is tried and sound, and the 10,000 miles of new and highly improved roads become an augury of a tremendous wave of new productive business activity. A most extraordinary amount of business transportation work can be done over 10,000 miles of good roads, and must be done to make them pay for themselves. Located where they are most needed, they will create work and business which would not be done without them. The transportation work will go to those who can afford the lowest bid.

If all that is claimed for trailers and semi-trailers can be verified, it is possible with the aid of them to haul two tons almost at the normal price of hauling one by motor truck alone. It is possible in most cases to haul four cubic yards of merchandise in one trip where the motor truck alone, with its more limited volume-capacity, could transport little more than half of this bulk in practically the same number of working hours, considering especially that a working day is a unit which cannot always be lengthened or shortened to suit the work at hand. And it is possible to handle transportation over a number of different routes with close reference to daily variations in the requirements for each route. Railway trains are made long or short on the same principle, an ideal roadbed being at disposal to permit it. It is proved to the satisfaction of many that trailer service involves these advantages if the conditions are favorable, but it is not yet widely known just how favorable the conditions must be, how good the roads, how suitable the motive power and the gears, or to what extent trailer service may be extended to common roads without running up against uncertainties similar to those which hampered motor truck service in bygone days, and even during the recent war when extraordinary conditions were encountered.

These questions are almost identical with an inquiry about the utility of trailer service in conjunction with any ordinary installation of motor trucks operated with little reference to road conditions, taking them as they come,

**EIGHT truck manufacturers recently wrote answers to the question "How Much Can a Truck Trail?" and, while they differed in viewpoints, all agreed on emphasizing that every instance must be analyzed separately. In the present article the author shows how any case may be analyzed in a few minutes. Anyone who can specify his roads somewhat as a small portion of a route is specified in Fig. 5 can answer his own trailer questions. Those who know their roads less well must be satisfied with a less definite answer. The method can be used backward as well as forward. Draw the desired work on the graph. The picture is always four straight lines only. Then trace backward to the outfit needed for realizing them. Or draw the lines for a given outfit on the graph and see if the work shown by the lines is suitable.**

but with a keen eye to a given set of business requirements, and the questions are therefore doubly interesting and timely. The answers as usually given involve terms and ideas with which the consumer is not quite familiar. Drawbar pull is figured by formula from engine specifications and "mean effective pressures." The application to any particular instance follows through a little series of arithmetical operations, simple enough for engineers who habitually reason in mathematical channels and have faith in the outcome, but forbidding to most laymen and not quick enough for executives. At the first technical knot in the thread of the demonstration they quit following. At the second they make up their minds that they will have to fight it all out with experience anyway, preferably with other people's experience. And so they decide to go slow, perhaps too slow. It is attempted in the following to sketch a method of investigation which is correct enough, can be easily amplified and which will remain alive and useful when passed on to the numerous actual and prospective consumers interested in deciding to what extent trailers and semi-trailers can be used advantageously under different conditions.

Table I shows the drawbar pulls obtainable at vehicle speeds from 1 to 20 miles per hour when certain net horsepowers are delivered at the rims of the driving wheels. Net horsepowers such as 15, 20 and 30, it is safe enough to figure, can be obtained from engines whose brake-horsepowers are rated 22½, 30 and 45, respectively, the efficiency of the transmission mechanism of the vehicle being taken as ⅔ or 67 per cent. This is a low rating for purely mechanical efficiency, but perhaps not too low for rough service when no other allowance is made for possible maladjustment of carburetors and cooling systems. At all events, the estimate can be suited to circumstances, the point at issue being the net horsepower delivered at the wheel rims. When the net horsepowers available for traction are taken as the starting point, questions of maximum engine speed and of cylinder dimensions are eliminated from the problem of ascertaining what can be done with trailers. It might be a comfort, however, if makers of trucks and tractors, who are in the best possible position for testing out the efficiency of their transmission gears, would generally adopt the practice of mentioning the maximum drawbar pull for each gear speed and a given diameter of driving wheels. And, if the engine is adapted for more than one fuel, the drawbar pulls for each of the fuels would make interesting reading for users.

The schedule of Table I can, of course, be expanded to include all net horsepowers of interest. The figures are obtained as follows: One horsepower overcomes a resistance of almost exactly 375 pounds at the rate of one mile per hour. From this figure all the drawbar pull figures are readily derived, being proportionate to power and inversely proportionate to speed. The column of speed figures in feet per second is given only to help in realizing what the different speeds mean in visible motion, as it is sensed by an onlooker. The table proves useful for the two main purposes, (1) to decide what can be done with trailers in conjunction with the trucks or tractors one has on hand, and (2) to decide what powers and gears would be preferable in trucks, tractors or tractor-trucks for the work one has on hand, the latter element including consideration of the local roads, maximum loads, and of the desired vehicle speeds. Drawbar pull in this connection is not, of course, understood to be the pull a motor vehicle can exert in addition to that required for moving itself, as sometimes applied in the case of traction by horses or traction engines, but includes the whole pull that can be developed by the motor unit. In all cases the drawbar pull has to overcome the whole traction resistance of the whole weight moved, and it is convenient to look upon this resistance as a percentage of the weight moved and as composed of two elements, one due to road grade, which is constant for a given route, and one due to road surface, which is nearly constant on the best roads, but highly variable, through the influence of weather and poor drainage, on poor roads.

A limitation to the increase of drawbar pull by gear reduction is imposed by the possibility of slip which occurs when the frictional resistance to spinning the driving wheels is smaller than the resistance to traction. The slip factor on hard and dry roads usually exceeds 60 per cent and permits a traction resistance not exceeding 60 per cent of that portion of the whole weight which rests over the driving wheels. On roads of looser structure the slip factor may drop below 40 per cent, and on roads made slippery by rain or snow to a much lower figure, which is, moreover, so variable from one spot to another that calculation is useless. The remedy is either to make the percentage of weight carried over the driving wheels high, as is done in motor trucks with large overhang and more radically in fourwheel-drive trucks, or to raise the slip factor by the well known means of traction rims on the wheels, traction chains or blocks, and to a certain degree by knobs on tires. The first method has the advantage of not raising the traction resistance but is not effective in extreme cases and not readily adapted to trailer service, in which it is the first principle to trail rather than to carry the load in order to secure large load space and other advantages. By the second method troublesome and incalculable slip is transformed into a not very objectionable increase of traction resistance accompanied by a dependable slip factor permitting the use of strong drawbar pulls.

When all the elements in truck and trailer operation here mentioned are made directly visible on a chart, it becomes possible to tell at a glance, almost, what may be done over a wide range of different circumstances. The matter of time consumed will be seen to depend largely on a favorable selection of gears.

Fig. 1 represents road conditions, including road grades up to 20 per cent and road surfaces causing traction resistances up to 20 per cent of the weight moved. The grades are scaled

**Table I—Drawbar Pull Obtainable at Speeds From 1 to 20 Miles Per Hour From Net Horsepower Available at Rims of Driving Wheels**

| Miles per Hour | Feet per Second | Net Horsepower Available at Rims of Driving Wheels | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 5 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 35 | 40 |
| 1 | 1.47 | 375 | 1875 | 3750 | 4500 | 5250 | 6000 | 6750 | 7500 | 8250 | 9000 | 9750 | 10500 | 11250 | 13125 | 15000 |
| 2 | 2.93 | 187 | 937 | 1875 | 2250 | 2625 | 3000 | 3375 | 3750 | 4125 | 4500 | 4875 | 5250 | 5625 | 6562 | 7500 |
| 3 | 4.40 | 125 | 621 | 1250 | 1500 | 1750 | 2000 | 2250 | 2500 | 2750 | 3000 | 3250 | 3500 | 3750 | 4375 | 5000 |
| 4 | 5.86 | 94 | 468 | 937 | 1125 | 1312 | 1500 | 1687 | 1875 | 2062 | 2250 | 2437 | 2625 | 2812 | 3281 | 3750 |
| 5 | 7.35 | 75 | 375 | 750 | 900 | 1050 | 1200 | 1350 | 1500 | 1650 | 1800 | 1950 | 2100 | 2250 | 2625 | 3000 |
| 6 | 8.80 | 62 | 311 | 625 | 750 | 875 | 1000 | 1125 | 1250 | 1375 | 1500 | 1625 | 1750 | 1875 | 2187 | 2500 |
| 7 | 10.26 | 53 | 268 | 536 | 643 | 750 | 857 | 964 | 1071 | 1178 | 1285 | 1392 | 1499 | 1607 | 1875 | 2143 |
| 8 | 11.72 | 47 | 234 | 468 | 562 | 656 | 750 | 843 | 937 | 1031 | 1125 | 1219 | 1312 | 1406 | 1640 | 1875 |
| 9 | 13.20 | 42 | 208 | 416 | 500 | 583 | 666 | 750 | 833 | 916 | 1000 | 1083 | 1166 | 1250 | 1458 | 1666 |
| 10 | 14.67 | 37 | 187 | 375 | 450 | 525 | 600 | 675 | 750 | 825 | 900 | 975 | 1050 | 1125 | 1312 | 1500 |
| 11 | 16.13 | 34 | 170 | 341 | 409 | 458 | 545 | 613 | 682 | 750 | 818 | 886 | 954 | 1022 | 1175 | 1363 |
| 12 | 17.60 | 31 | 156 | 312 | 375 | 437 | 500 | 562 | 625 | 687 | 750 | 812 | 875 | 937 | 1093 | 1250 |
| 13 | 19.07 | 28 | 144 | 281 | 346 | 404 | 461 | 519 | 578 | 634 | 692 | 750 | 807 | 865 | 1009 | 1154 |
| 14 | 20.53 | 27 | 134 | 268 | 321 | 375 | 428 | 482 | 536 | 589 | 642 | 696 | 750 | 803 | 937 | 1071 |
| 15 | 22.00 | 25 | 125 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 875 | 1000 |
| 16 | 23.47 | 23 | 117 | 234 | 281 | 328 | 375 | 421 | 469 | 515 | 562 | 610 | 656 | 703 | 820 | 937 |
| 17 | 24.93 | 22 | 110 | 220 | 264 | 308 | 353 | 397 | 441 | 485 | 529 | 573 | 618 | 662 | 772 | 882 |
| 18 | 26.40 | 21 | 104 | 208 | 250 | 291 | 333 | 375 | 416 | 458 | 500 | 541 | 583 | 625 | 729 | 833 |
| 19 | 27.86 | 20 | 98 | 197 | 236 | 276 | 316 | 355 | 394 | 434 | 473 | 513 | 552 | 592 | 691 | 789 |
| 20 | 29.33 | 19 | 94 | 187 | 225 | 262 | 300 | 337 | 375 | 412 | 450 | 482 | 525 | 562 | 651 | 750 |

Net horsepower available at rims of driving wheels may be taken as ⅔ of engine's brake horsepower.

vertically and the surface conditions horizontally. A small area at the lower left corner of the graph represents highly improved roads. The adjacent area in lighter shading represents inferior road conditions, including the steepest grades and poorest surfaces likely to form more than a negligible portion of the mileage in any territory where the commercial demand for haulage would justify regular motor truck or trailer service. All the rest of the area represents conditions which are met only sporadically and for very short distances, so that they do not appreciably affect the time consumed in covering a route, even if low gear must be employed in overcoming them.

The grade scale stands for the usual "per cent grades." Fig. 2 shows that this scale is not strictly proportionate to the drawbar pulls required for hauling loads. The line *AC* is the 20 per cent grade, but the line *BC* is the grade demanding a drawbar pull twenty times stronger (apart from the traction resistance of the surface in both cases) than that required for a 1 per cent grade. *AE* is the 10 per cent grade, and varies so slightly that the difference can scarcely be illustrated, from the grade over which the distance travelled is exactly ten times the rise of the road, making the needed pull just ten times smaller than the weight hauled. The discrepancy grows progressively as the grade gets steeper but is unimportant and not even sufficient to balance against another small discrepancy arising from the fact that the low gears required for the steeper grades nearly always are slightly less efficient than

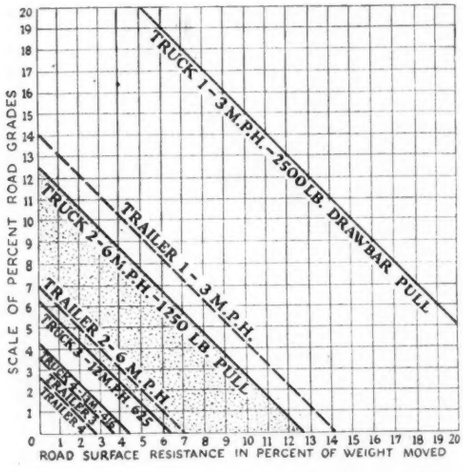

SCALE OF PERCENT ROAD GRADES
ROAD SURFACE RESISTANCE IN PERCENT OF WEIGHT MOVED
TRUCK 1 - 3 M.P.H. - 2500 LB. DRAWBAR PULL
TRAILER 1 - 3 M.P.H.
TRUCK 2 - 6 M.P.H. - 1250 LB. PULL
TRAILER 2 - 6 M.P.H.
TRUCK 3 - 12 M.P.H. - 625
TRAILER 3

*Fig. 1—Graph of resistances to vehicle movements due to grades and irregular or soft road surfaces Each square represents a total resistance determined by its vertical and horizontal distance from the zero point at the lower left corner. The light area at this corner therefore represents good roads having light grades and favorable surfaces. The adjoining area in shading represents common roads, and the rest of the squares difficult and unusual conditions increasing in severity toward the upper right corner. The oblique lines show the total resistance which can be overcome on each of the four gear speeds of a loaded truck and by the same truck when pulling a loaded trailer*

the higher gears. These matters, while worth watching to avoid serious errors, sink into insignificance compared to the looseness in estimates of grades, surface resistances and distribution of weight and loads which can never be avoided in practice.

The scale of surface resistance in the graph, Fig. 1, is based, like that of grades, on an addition to the traction resistance equal to 1 per cent of the weight moved for each higher numerical unit on the scale. Only a small portion of it, up to about 5, represents normal surface resistances

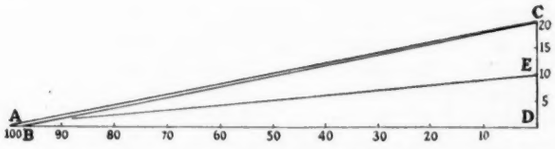



*Fig. 2—Illustrates the small difference between a "20 per cent grade," AC, and the grade BC on which that portion of the resistance to traction which is due to grade alone, exactly equals 20 per cent of the weight moved. In the case of the "10 per cent grade," AE, the difference is too small to be shown, the two lines almost coinciding. The grade BC equals AD in length*

of those roads on which something like 90 per cent of truck and trailer traffic is carried on at present. Paved and macadamized roads usually make less than 2 per cent of resistance on level stretches. Old brick, asphalt or wood blocks often raise the resistance to about 3 per cent before repairs are made. A macadam road considerably broken up easily reaches a resistance of 5. The average earth road, when dry and fairly hard, is rated at 2 to 6. Wet and rutty it may defy all estimate, being so variable, but this condition is rarely combined with steep grades, except in clay on mountainsides. It may be slippery, too, requiring an additional rating for the use of traction devices to avoid slip. Loose gravel is supposed to raise the resistance to as high as 15. Plowed land or sand may bring it to 20 or higher. There is nothing firm or final about the ratings, and the graph gives only the division on a percentage basis. All have to guess more or less as to what percentage of resistance a poor road surface offers. Only good roads are uniform.

There is shown on the graph the scope of road conditions that a loaded 2½-ton truck, weighing five tons, can cope with on each of its four gears, having an engine delivering 20 net horsepower at the wheel rims and carrying from two-thirds to seven-eighths of the total weight over the driving wheels. The gear speeds are taken to be 3, 6, 12 and 18 miles per hour. These are hurry gears for a truck of this size, but it is the object to pick an example rather unfavorable for trailer service, thereby bringing out more strongly what the effect of a great addition to the good-roads mileage is likely to be, such roads being shown to permit heavy trailer service at fair speeds even with unfavorable proportions of the gears of the motive power. Other power, gear and load combinations can be tried out in a few minutes by the reader with the aid of Table I and a sheet of paper ruled in squares.

For the truck selected, the oblique lines marked "Truck 1," "Truck 2," "Truck 3," "Truck 4," cut off to the left of them all the road conditions that can be negotiated in each case. As shown in Table I, the low gear gives a drawbar pull of 2500 lb., and this will admit of climbing a grade of 25 per cent, as 2500 lb. is 25 per cent of 10,000 lb., the total weight. But grades above 20 per cent need not be considered. So the line is drawn from the point in the graph denoting a 20 per cent grade combined with a 5 per cent surface resistance to the point representing a 5 per cent grade with a 20 per cent surface resistance. At all intermediate points along the line the sum of the grade resistance, shown on the ordinate (vertical), and the surface resistance, shown on the abscissa (horizontal), is 35. At all points to the left of the line the sum is smaller, denoting easier road conditions.

On the second speed, giving 6 miles per hour, the truck can negotiate grades up to 12½ on the best roads, or it can climb grades up to 2½ on roads giving the enormous surface resistance of 10 per cent, as the graph shows, the second line being laid down on the same principle as the line for the low gear.

The line for the third speed, or 12 miles per hour, takes in all roads that may be designated as good, having no grades above 4 per cent and no surface resistances above 3 per cent. And in addition it takes in well-surfaced roads up to 6 per cent grades and poorly surfaced roads with grades from 0 to 4.

The high speed, 18 miles per hour, will, of course, not ordinarily be employed with full load, but the graph shows that it can be employed on the majority of good roads. Usually the engine will be throttled to reduce the speed, with some loss in fuel efficiency.

Now let the trailer loaded with another 2½ tons of merchandise be hitched to the truck. Such a trailer may weigh about 1½ tons, making the addition to the weight hauled 4 tons and the total 9 tons, or 18,000 lb. The drawbar pull figures remain unchanged, and the load on the driving wheels is also the same as before. To get the lines showing what roads can be negotiated, it is only necessary to figure the new percentages of the total weight which the drawbar pulls now represent. If 2500 lb. is 25 per cent of 10,000 lb., what percentage is it of 18,000? Multiply by 10 and divide by 18. This gives a shade below 14. The line marked "Trailer 1" is drawn accordingly to show what truck and trailer with a combined load of 5 tons and a weight of 9 tons can do on low gear. Proceeding by the same method, one sees that the drawbar pull of 1250 lb. on second speed represents 7 per cent of the total weight, and the line drawn accordingly, from 7 grade to 7 surface resistance, takes in practically all good roads and a majority of common roads at 6 miles per hour. The third speed with trailer takes in the larger portion of good roads at 12 miles per hour. And in most cases much of the larger portion, perhaps usually as much as seven-eighths of the mileage of a route lies over roads of this character, so that little time is lost in comparison with the truck alone, which on the same roads often must be held down to about the same speed for reasons of prudence, maintenance cost and legal rules for heavy traffic. On high gear, at 18 miles per hour, the trailer outfit takes in grades or road resistances up to 2.3 per cent.

In all cases a slip factor (traction coefficient) of 40 per cent is sufficient to secure the hauling of the trailer, as the minimum load at the contacts of the driving wheels with the road is 6667 lb., and for trucks of the overhang type more than 8000 lb., while the maximum drawbar pull is 2500 lb.

Special resistances may arise. The use of traction devices to overcome temporary slipperiness may be considered as normal and included in the scope of the graph, justifying an increased rating of the surface resistance by 1 to 2 per cent, and allowance may likewise be made for the additional resistance encountered on curves and especially at sharp turns, due to misdirection of the drawbar pull. Starting with the wheels in a hole may cause difficulty which the driver cannot always avoid. At the top of a hill, with the trailer still on the slope, a similar increase in resistance occurs. The graph shows that the low gear will take care of these factors, even all combined, unless the otherwise existing road condition calls for low gear and nearly exhausts its capacity. If a route contemplated for trailer service presents possibilities like those mentioned, provision should, of course, preferably be made for them in laying down the low gear line and selecting motive power, gears and loads in such manner that the required low gear line can be realized.

There is need of a good scale of surface resistances. Some experienced road specialists may have the data, but there is a difficulty in designating the different materials and qualities by such terms that anybody can identify them with the actual condition of an actual road which he has in mind from personal observation or which has been carefully described to him. Some data on the effect of wheel diameters also remain to be collected, as large semi-trailer wheels, for example, meet smaller surface resistance than ordinary truck and trailer wheels, yet not always in inverse proportion to diameters. Hauling is not meticulous laboratory work, however. With a few fixed surface data, distributed along the scale from 0 to 15 per cent and well authenticated, one who estimates a given route should have no trouble in assigning the proper per cent value to intermediate road qualities not specified on the scale. Experience in distinguishing sharply between grade and surface resistances is perhaps the main personal requirement. At worst the low gear will take care of many errors, so far as muddling through is concerned. A determined call for the best surface resistance scale, well phrased and possibly illustrated, might elicit something of great interest in this connection, as well as in other directions.

The method which has now been outlined permits a good deal of experimenting and demonstrating to be done handily on paper, and it may be turned to account for good salesmanship and for securing the best utilization of any fleet of motor trucks and trailers operated over a number of routes. At one point of some importance Fig. 1 is lacking, however. It fails to visualize or suggest the time factor, because a square representing a bad road condition, of which there may be a fraction of a mile, is just as large and prominent on the graph as another square representing a road condition of which there may be twenty miles. Trailer time often comes near equalling

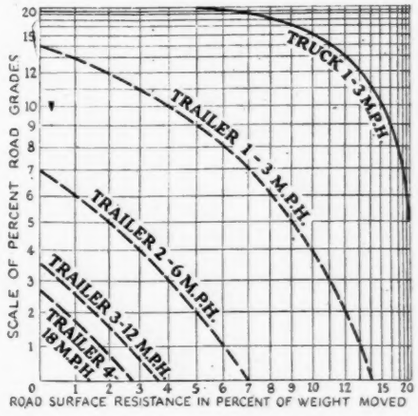

TRUCK 1-3 M.P.H.
TRAILER 1-3 M.P.H.
TRAILER 2-6 M.P.H.
TRAILER 3-12 M.P.H.
TRAILER 4-18 M.P.H.
SCALE OF PERCENT ROAD GRADES
ROAD SURFACE RESISTANCE IN PERCENT OF WEIGHT MOVED

*Fig 3—Graph picturing road conditions somewhat in proportion to their prevalence, each square or rectangle representing a certain total resistance to traction by its location, and the probable frequency or mileage by its area. The curves represent the same truck and trailer as the oblique lines on Fig. 1, the whole area to the left of them denoting roughly the share of all road conditions which can be negotiated in each case*

truck time, because those bad or steep stretches are very short, which call for a lower gear with the trailer than with the truck alone. As no two routes are quite alike, the running time can be figured closely only by means of specifications or charts for each route, but a general idea of distances, difficulties and time consumption can be conveyed by means of a graph like Fig. 3 and the tell-tale gear lines laid down in such a graph. It may be used in the same manner as Fig. 1, and the lines shown in this case are the low gear line for the same truck as in Fig. 1 and all the lines for the trailer outfit from Fig. 1. These lines here become curves. This graph is shown here not because it is believed to be thoroughly practical with reference to trailers. It sacrifices simplicity too much for this

purpose and is not specific enough. It illustrates a situation but does not give figured values for distances and time. But it is presented because it may be found particularly useful for choosing, examining and demonstrating the capacities of trucks and tractors whose relations to their work are judged on a plan of generous allowances in matters of power and weight for the overcoming of exceptional difficulties when the need arises.

Each of the small squares or rectangles in Fig. 3 pictures by its comparative area the probable frequency or mileage of the road condition, or working condition, which is designated by its location in the graph. So far as roads are concerned, as all roads are intended for removing difficulties in transportation, it is a fair assumption that frequency or mileage of a given road feature is in inverse proportion, on any given route, to the difficulty or road resistance it presents. The nature of the graph is based on this assumption, which may be extended to tractor work with some modifications, and should be useful for estimating the required types and specifications of vehicles, with the time factor easily if not accurately included in the considerations. But this interest is largely professional.

With closer reference to trailer work and the timing for routes whose peculiarities are known and may be charted, one reverts to the simpler type of graph. Fig. 4 shows one way in which the normal resistances of a route may be marked with their corresponding mileage upon those squares in the graph which represent the various resistances concerned. Gear speed lines for available transportation units and desired loads may be laid down, and it may then be observed to what extent the marked squares come inside or outside (left or right) of the respective speed lines. Time can then readily be figured,

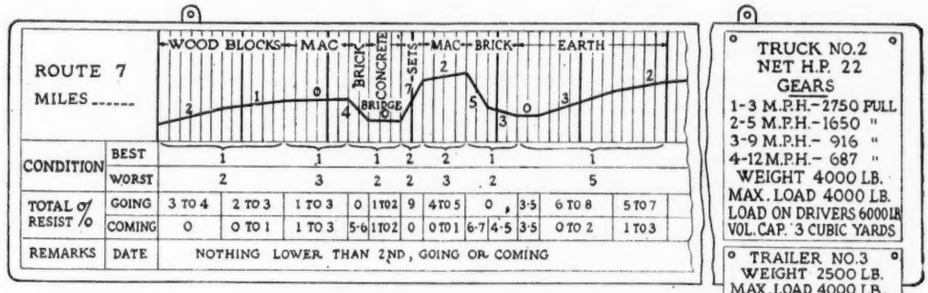



*Fig 5—Portion of route chart with exchangeable vehicle tickets as adapted for use by transportation company operating a number of routes daily, with variable loads and variable combinations of trucks or tractors, trailers or semi-trailers. The route, in rough profile, is divided in ⅛-mile stretches. Nature of road and per cent grades are marked above and along the route line. Surface resistances at their best and worst are marked below. Total road resistances are footed up, subject to whatever changes may occur in the road condition from day to day. In practice, only the doubtful stretches should be considered, and these mainly when unusual loads require an unusual combination of the vehicles and the method is not laborious when Table I and graph blanks are at hand.*

Fig. 4 shows the lines for a tractor-truck with semi-trailer in addition to the markings for a supposed route. The following data are assumed for the semi-trailer outfit: Horsepower 30 at the driving wheels, gears 2, 5, 8 and 15, weight of tractor-truck 2½ tons, weight of semi-trailer 1½ ton, payload 6 tons, weight on drivers 3¾ tons, weight on trailer wheels 4¾ tons, total weight 10 tons. It will be noticed on the graph that in this case the low gear cannot be made useful up to the power limit without the use of special traction devices for raising the slip factor.

Traction resistance on downgrades need rarely be considered, and the timing for downgrades may be estimated somewhat according to the degree of caution desired of the driver. If heavy surface resistance occurs on a light downgrade the net resistance can, if necessary for completeness, be marked under the base line of the graph. To illustrate the possibilities, the writer remembers one serpentine downgrade six miles long and averaging 13.2 per cent on which the pull of the grade was not everywhere sufficient for overcoming the drag of the sandy roadbed. And a great deal of trailing had been done over it, not by motor truck, but by 20-mule teams.

Fig. 5 shows a plan for a separate route chart that may be pieced up in sections—since routes, too, may vary from day to day—and pictures the road data for both directions of travel. It can probably be much improved in the hands of skilled fleet operators, as by eliminating all detail of features which present no difficulties.

While the method described in the foregoing for tracing the requirements in horsepowers and gears are applicable to ordinary motor truck work as well as to trailers, something of this order is no doubt more widely needed in connection with trailer equipments, as these are very low powered transportation units for their loads and cannot possibly be as independent of road conditions as trucks must be in order to be saleable, while, on the other hand, they exhibit ample justification over a wide range of conditions and circumstances, partly by moving loads too heavy for trucks of general utility and perhaps even more by large volume capacity and great flexibility in their adaptation to varying demands. In this article the only aim has been to indicate an easy way to estimate with some degree of accuracy the ton-load and ton-mile capacities that are compatible with any set of road conditions, in which estimate the X may be on either side of the equation.

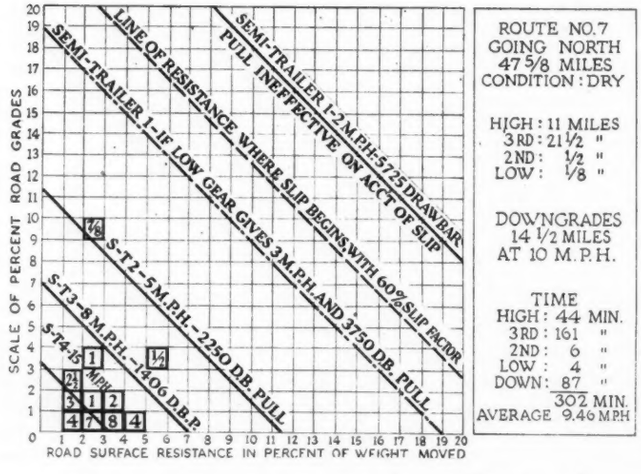



*Fig. 4—Graph on the same plan as Fig. 1 and showing the work and working limitations of a semi-trailer outfit. Without connection herewith, there is indicated on the graph, by marked squares and figures in the same representing mileage, a system for viewing the road conditions of any given route in relation to the hauling capacity of a transportation outfit, including timing of work over the route*

# A Commercial Monoplane Designed to Carry Pilot and Six Passengers

**Clean design with minimum parasite resistance and efficient wing curve said to result in excellent performance. Wings externally braced. Both passengers and crew have clear vision downward.**

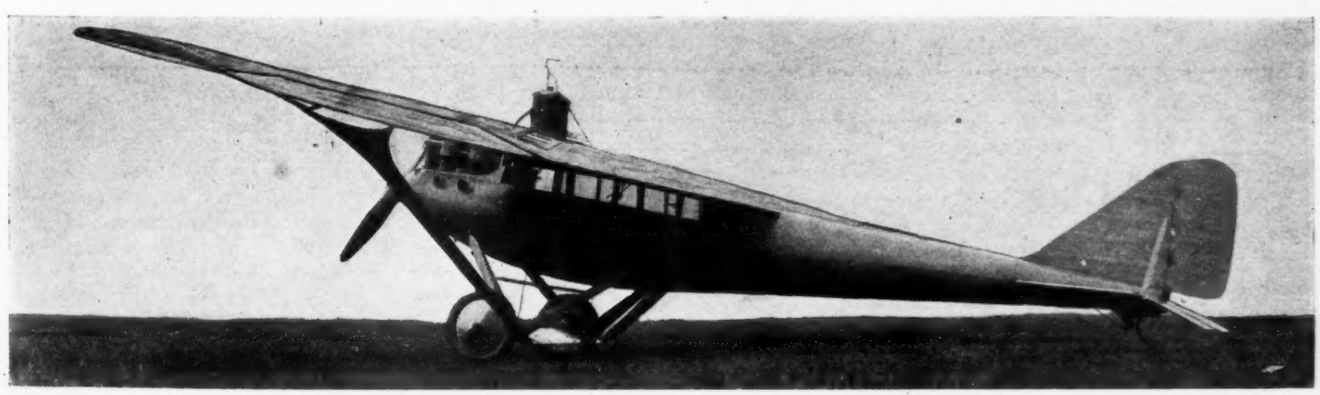
THE monoplane shown in the accompanying photographs was built expressly for passenger carrying purposes and with the object in view of providing a strictly commercial ship embodying efficiency and comfort.

An externally braced monoplane is used to make possible a thin wing section with consequent high efficiency at high speeds. The wings taper in plan from the fuselage to the tips and are constructed of wood and fabric. The webs and beams used are said to be of more liberal design than those used in standard biplane wings of equal dimensions. There are, besides the usual two beams, twelve auxiliary strips linking the webs together and adding greatly to the strength of the wings. The wings are braced by Y-shaped struts which pass from a tie rod just back of the landing wheels to a point about two-thirds out on the wing, the strut dividing and fastening directly onto each beam. The planes themselves have a small dihedral. Large ailerons are cut into the trailing edge of the wings and are actuated by a strong and positive system of tubes and cranks which connect them with the dual stick control.

The landing gear has its two wheels spaced with a 7-ft. tread, which makes it easy to avoid tipping when landing. The wheels are of the wire-spoke extra strong type and carry 750 x 125 mm. tires. They are mounted upon a 2-in. tubular axle. Streamlining between this axle and the tie-rod holding the wing struts is in the form of an airfoil, the axle being the leading edge and the rod the trailing edge. Landing shocks are absorbed by rubber cords, which allow the axle to rise against stops 6 in., the leading edge of the small airfoil rising with it and the rest of the airfoil remaining in place.

The design embodies unusually clean lines. The fuselage merges directly into the center section, the roof of the passenger compartment being ply-wood and conforming to the wing curve. The fuselage is made up of six main longerons 1⅝ in. by ⅞ in., together with eighteen longitudinal ribs ⅞ in. by ⅜ in., all of which are supported by fourteen ply-wood bulkheads and inclosed in a laminated covering ¼ in. thick, thus forming a rigid structure. The fuselage terminates at its rear in an aluminum casting in which the rudder and elevators turn. The passengers are accommodated in three seats arranged in tandem. The first seat accommodates two people, either of whom may pilot the plane or, with one stick removed, one may pilot and the other be a passenger. The second seat holds three people and the rear one two. Entrance is through a door on the left side and at the front of the compartment, a portion of the first and second seats hinging to enable easy access to the rear seat. The windows which reach the entire length of the passenger compartment, are placed in a portion of the fuselage which slopes inward at the bottom, thus an excellent view downward is obtained. There is a dome light in the roof of the cabin. The fuselage looks small for its capacity. Head-room is provided by utilizing what would ordinarily be the interior of the center section of the wing.

The rudder is controlled by two sets of pedals, all of which are interlocked and work in unison, being connected to the rudder by cables entirely within the fuselage. The pilots have good forward vision through windshields provided with large openings at the side, making it easy to remove any moisture which accumulates on the glass. Side vision is obtained through the windows already mentioned. There is a mahogany instrument board mounting an air-speed indicator, altimeter, motometer, revolution counter, ignition switch and oil pressure gage. The spark and throttle are controlled by levers centrally located within easy reach of either front seat. There are fuel shut-off cocks within easy reach of the pilot with which he can cut out either or both of the fuel tanks. Small levers within convenient reach of the operator give the radiator shutter any desired setting when in flight. A locker on the right directly under the



*The Jacuzzi commercial monoplane, carrying seven persons*

instrument board contains the storage battery while a similar locker on the left is available for tools, etc.

The engine used is a Hall-Scott L-6 capable of developing over 200 hp. but in this airplane it is said to require an average output of about 100 hp. at the average flying speed of 100 m.p.h., thus providing ample reserve power, which when all used is said to increase the speed to over 125 m.p.h. Delco ignition and two Stromberg carbureters are used. The engine is mounted in the forward end of the fuselage and turns a propeller 8 ft. 2 in. in diameter.

Precaution is taken against fire by allowing practically no chance for an accumulation of gas or oil vapors in the fuselage. Overflow from the carbureters is led away through pipes. The carbureters receive their air through scoops cut through the side of the fuselage, thus eliminating practically all back-fire hazard. The fuel is carried in two gravity tanks made of copper and mounted in the wings at either side of the fuselage. Fan-driven pumps deliver all fuel in these tanks to their highest point, thus maintaining a constant gravity head at all fuel levels. The portion of the fuselage immediately under the engine is provided with a large number of ventilation holes.

Cooling is by a radiator mounted in unobstructed position and provided with a heavy canvas shutter which when entirely open is rolled up at one side of the radiator. As previously stated, this shutter can be given any desired setting while in flight. The venturi tube of the air-speed indicator is mounted high above the radiator out of the propeller slip-stream and all air disturbances set up by the plane.

The following specifications and performance data are furnished by the manufacturer, Jacuzzi Bros., Inc.:

| | |
|---|---|
| Length over all | 29 ft. |
| Span | 52 ft. |
| Height (top of radiator) | 10 ft. 6 in. |
| Wing area (with center section) | 400 sq. ft. |
| Weight empty | 1,800 lbs. |
| Weight fully loaded | 3,400 lbs. |
| Fuel capacity | 80 gal. |
| Oil capacity (outside engine) | 4 gal. |
| Fuel consumption per hour | 8 to 9 gal. |
| Radius of action | 900 to 1,000 mi. |
| Speed, half throttle | 100 mi. per hr. |
| Speed, three-quarter throttle | 125 mi. per hr. |
| Minimum landing speed, full load | 45 mi. per hr. |
| Minimum landing speed, half load | 38 mi. per hr. |
| Approximate ceiling | 22,000 ft. |

According to the builders, the plane handles exceptionally well, the rudder being markedly effective in taxying. The wings are notably rigid in flight due no doubt largely to their great depth near the fuselage and the special interior construction. A landing sufficiently bad to collapse one wheel and bend the axle is said to have failed to indicate weakness in the design or construction of the rest of the landing gear. The performance of this plane is attributed to the unusually clean design in which parasite resistance has been reduced as much as possible, while at the same time a wing section of high efficiency is employed.

# One and a Half Million Miles Flown by Air Mail Planes

MORE than one and a half million miles flown by the planes in the Air Mail Service shows that 21 of these planes have traveled more than the distance around the earth at the Equator. The prize plane of these veterans of the air was D. H. Plane No. 76, which flew 38,348 miles in 407 hours and 8 minutes before it went out of service on Oct. 16, 1920. The average speed of this plane was 94.4 mi. per hr. The plane with the next greatest record was D. H. Plane No. 74, which flew 38,381 miles in 420 hours and 15 minutes, and is still going strong across the Sierra Nevada Mountains from Reno to San Francisco. It is one of the planes that the Air Mail mechanics expect to see make a record of 50,000 miles or better. Its average speed has been 89.1 mi. per hr. through the entire period of its activities. This plane added 3443 miles to its record during the months of January and February. Four other De Haviland planes have each exceeded 30,000 miles of operation.

Next to these top-notchers in the mail service stand the two Curtiss R-4 planes. Of these, No. 31 had a record at the close in 1920 of 33,644 miles in 378 hours and 49 minutes in the air. This is an average speed of 88.8 mi. per hour. The second Curtiss R-4 plane with better than 30,000 miles was No. 35, which covered 30,948 miles in 397 hours and 25 minutes, an average speed of 77.9 mi. per hr. Planes Nos. 31 and 35 are operating between New York and Washington to-day, and the former has flown an additional 6885 mi. during January and February.

The first airplanes used in the Air Mail Service on the date of its inauguration, May 15, 1918, were Curtiss JN-4 training planes, Nos. 11 and 12. Both of these are in operation to-day between St. Louis and Chicago. No. 11 has flown 31,208 mi. and No. 12 30,090 mi.

The first planes purchased by the Post Office Department were 8 machines manufactured by the Standard Aircraft Corporation of Elizabeth, N. J., which was in business only during the war. Seven of these eight planes are still in existence, two of them flying daily between Chicago and St. Louis. Their record is 15,781 mi. and 10,256 mi. respectively.

Two of the Glenn L. Martin twin motor mail planes put into service in the winter of 1919 have exceeded 25,000 miles of service. Plane No. 201 of this type has flown 27,757 mi. at an average speed of 75.3 mi. per hr. Plane No. 202 has seen 25,593 mi. of service at an average speed of 89.2 mi. per hr. Both of these two planes are being repaired and overhauled and give promise of getting into the 40,000 to 50,000 miles class.

The Junker all-metal monoplanes are the latest planes put into the Air Mail Service. They have not had the mileage that should have been obtained from them, owing to the fact that they had serious engineering defects in their fuel system and engine installation. One of these planes covered 7677 miles between August and Dec. 31, at an average speed of 81.1 mi. per hr. A second of the all-metal monoplanes has flown 6159 miles. Both of these planes have additional mileage accumulated during January and February.

Up to Dec. 31, 1920, the planes in the Air Mail Service have flown 18,806 hours and 37 minutes and have covered 1,572,450½ miles. This is an average for all types of planes under all conditions of operation of 83.6 mi. per hr. In that period they have carried more than 49,000,000 letters. The mechanics' time and the cost of airplane and repair parts over this entire period of service have been at the rate of 30.5 cents per mile flown.

In announcing this performance of the Air Mail planes, the Post Office Department gives due credit to the mechanics who are keeping them in condition for the daily flights, and the pilots who have handled them with daring and judgment under most trying and adverse conditions of weather.

# A Labor Dispute Which Was Settled by Frankness

**The following article describes how an Eastern manufacturer succeeded in coming out of labor trouble with more good will from his employees than when he went in. The accomplishment was due to the simple expedient of laying all the cards face up on the table.**

IT is possible for an employer to come out of a labor difficulty with more good will from his workmen than when he went it. One executive recently "got together" with his workmen and solved mutual difficulties merely by laying all the facts on the table, even when the difficulties had gone so far as to result in a strike affecting an important "keystone" department. The details of the settlement are of interest to the many other manufacturers who are, unfortunately, meeting similar situations with only too great regularity.

About 1500 men are employed in this plant, which is located in a town of about 15,000 inhabitants. Ever since the establishment of the concern in 1898, it has been the custom of the management to adjust all differences with workers through a committee elected by the employees to represent them. An open shop has been maintained.

Union agents have attempted to organize the plant, but had met with little success over a period of years. Finally, however, they did manage to organize the foundry. Shortly after, a strike was threatened, the demands being for a reduction of the working day from ten to nine hours, maintenance of the present wage scale, and recognition of the union. The management refused to deal with the union agents, but was willing to discuss the wages and hours demand through the usual representative channels.

This status continued for a day or so, when the foundrymen finally did walk out. The next day the management urged the rest of the workers to remain loyal and to choose their representatives for conference so that the actual facts surrounding the demands and the possibility of granting them might be threshed out. One or two men in a certain department were known to be among the ultra-radical group. The management urged that they be elected in the committee representing the workers. One of these men in particular had been putting forth many heated and radical arguments. He was chosen as a member of the shop committee.

When the committee met in conference with the general manager, the latter put the following facts before them:

1. He showed the committee actual charts prepared from production records which proved that since 1914 the production of the plant per man per hour had decreased about 33 1/3 per cent.
2. He showed them similar charts from the foundry production record for the last two years which showed on the graph a very sharp and steady decrease since 1916. the percentage being much greater than for the rest of the plant.
3. He told the committee that he knew the men were loafing; that it was proved by these records. He said that he knew they could produce as much in nine hours as they were now in ten—if they would; they could do it even in seven hours, if they tried.
4. He told them he had known of this condition for a long time, but had said nothing in the belief that after the war things would settle down and conditions would return to normal; but that present conditions could not continue if the plant was to go on operating successfully.
5. He explained to them that local conditions had much to do with the number of working hours. In this town no workman lives more than a mile from the plant, most of them within five minutes' walk. Thus they have as much time at home as the man in New York City who actually works only eight hours.

When these facts had been presented, a lively discussion followed in which nearly every member of the committee took part. Objections were brought up and were answered by the general manager. One of the outgrowths of the discussion being that the radical member of the committee was unable to successfully defend in open forum and in the face of true facts laid on the table the views he had been disseminating. This very man, in fact, got up and finally said:

"We *have* been loafing on the job. I know it and you know it. We have the facts here, and the thing for us to do is to go out there and really begin to produce something."

The management then proposed to try a nine-and-one-half hour day temporarily with the same rate of pay as for ten hours, with a promise of readjustment later if it seemed justified. This proposal was agreed to.

In the meantime, of course, the foundrymen were on strike. The committee members after this meeting went out and talked with the striking men, told them they could come back—if they came at once without recognition of the union—and that they would be better off to do so. The next morning all the strikers were on deck.

The immediate trouble was thus settled—a desirable but by no means an ultimate end. Frequently employers have been able to break a strike in one way or another and get the men back to work, but too often the resulting ill-feeling that has been aroused reflects very definitely in even more greatly decreased production and discontent. In this case, however, the strike was taken as an opportunity to give the workmen true facts in regard to the entire situation. By laying all the cards on the table, and then frankly inviting discussion, this management came out of a strike with a greater feeling of good will and co-operation on the part of its workers than at the start. That is the unusual feature of this experience.

Proof of this is shown in production records since that time. Production in every department of the plant has risen, especially that in the foundry.

This settlement illustrates strikingly the possibilities presented to the management which, with a really honest purpose, is willing to put the facts before their employees. The name of the concern is withheld merely because the story is a rather intimate one, while the facts are applicable in one place as well as another.

# Where Is the Motorcycle Going?

**The general status of the industry, together with the relation between foreign and domestic business, was discussed last week. This article takes up the more detailed problems of overcoming prejudice, over-emphasis of racing, the size of the future motorcycle, and the field for future development. Vital necessity for cooperative effort by manufacturers is indicated.**

By Norman G. Shidle

IT may be admitted that so far as the opinion of the general public is concerned, the motorcycle has a distinct prejudice to overcome. The automobile once had the same difficulty, but the automobile succeeded in overcoming it; the motorcycle has not yet done so.

In seeking the best means by which this prejudice may be overcome, the necessity for co-operative effort among the manufacturers becomes apparent. In an industry composed of so few units, it should not be difficult to get together to boost the industry in general for the good of each individual. This is necessary if any real progress is to be made. The chief necessity for the motorcycle in the domestic field is the widening of the potential sales market. No real progress will be made while the manufacturers content themselves with fighting over the business available in the present market, which seems to have grown smaller—certainly not larger —during recent years.

### Why Not Study England?

The situation in England presents a field for study in this connection. The motorcycle is undoubtedly popular there and American manufacturers might gain by attempting to analyze thoroughly the reasons for this fact with the idea of adapting them to American merchandising conditions. Some interesting material was recently presented by M. Olley, chief engineer of the Rolls Royce Co. of America in this connection. He said in part:

"The motorcycle is becoming an institution in England and is used by old and young, and by both sexes almost equally.

"On English roads and in English weather, it is the perfection of motoring as distinct from mere luxurious riding. The machine amounts to nothing in itself, weighs only 150 lb., is no bigger than an ordinary bicycle, travels 100 miles on a gallon of gas, yet transports you anywhere at 30 miles an hour average and 60 miles an hour maximum speed.

"It can never lose its place in the affection of the British motorists, probably 80 per cent of whom have served their apprenticeship on motorcycles. It is a fine training for driving a car.

"Design in England is affected greatly by the essential democracy of its inhabitants or perhaps by the fact that there the car is not the standard of the man.

"Here a man will buy a car of cost proportioned accurately to his income or his pretensions.

"There a cabinet minister or railroad president will own a Ford sedan, or will take pride in the possession of a miniature vehicle peculiar to the country, called a 'light car' or voiturette, and resembling a traveling bathtub. His social status is not governed by the car he drives, or by his income, but rather by the particular accent with which he speaks the English language."

It is obvious that as general prejudice to the motorcycle is lessened the sales field will widen. One way in which co-operative effort may be effective is in a definite attempt to break down this barrier of prejudice. A co-operative publicity campaign, conducted along broad and intelligent lines, in a conservative and dignified manner, would go far toward accomplishing this end.

No single manufacturer, naturally, wishes to undertake such an effort alone, since the benefits would be shared by the others without cost. But the general benefit to the industry from such a campaign will be great. It is, in fact, the understanding of the writer that such a movement is practically under way. It will be to the lasting benefit of the industry.

**This is merely a single instance, however, of the way in which active co-operation is needed among the manufacturers. The industry as a whole cannot grow unless all of its units are willing to bury their small grievances against one another and fight shoulder to shoulder for a common end.**

**Outsiders cannot be expected to have much respect for the various manufacturers if they have but little for each other. In every possible manner co-operative effort for the boosting of the motorcycle in general should be fostered by the motorcycle manufacturers. Along this line lie some of the best possibilities for the future progress of the motorcycle.**

The motorcycle has been merchandised chiefly as a sporting proposition. It has appealed almost entirely to the young man with a love of speed and hard riding; the young man who likes a thrill, and who gets real joy from dashing over open stretches of roads as fast as his machine will carry him.

To this group the motorcycle still appeals and will always appeal. The sales in this field are so great as to constitute an overwhelming percentage of the entire motorcycle sales in the United States. Since this is the backbone of the motorcycle trade, it is obviously necessary that every effort should be made to sell to this field and to develop it to its fullest. The manufacturers are accomplishing this with a large degree of success.

**But this field is obviously limited in scope, and if the motorcycle confines itself within these limits, the end of its development is not far distant. Other fields must be opened up if progress is to be made. And the overemphasis of this sporting phase in both publicity and interest among dealers and manufacturers is likely to hinder that further development.**

Racing, for instance, is an extremely expensive form of advertising. The cost of financing riders and equipment, of manufacturing and developing special engines for racing work, etc., constitute an enormous expense. One factory advertising manager recently said something like this in regard to racing:

"It's great, we all admit; but, lands sakes, how it costs! If you have your doubts about the cost, just ask some of the dealers who footed the racing bills last season. It puts some nick in our advertising budget and the annual cost runs into six figures. . . . For the factory to attempt to support a third or one-half of all the races would load an excessive and unfair cost on the retail price of stock machines and side-cars."

Racing as an aid to sales is scarcely of value in proportion to the financial burden which it imposes. It has a favorable influence only with a limited class of prospects, and its influence on the more intelligent of this class of speed and sport lovers is probably not as great as is generally imagined. Any sensible motorcycle purchaser knows that the machine he buys is nothing like the machine of the same name which has won the various races and that fundamentally the two have little in common except that they were made by the same manufacturer.

Certain types of racing, moreover, have a definitely bad influence on outside persons, who might otherwise be favorably inclined toward the motorcycle and thus become prospective purchasers. The establishment of road records, for example, has caused a great deal of unfavorable criticism for the motorcycle. So strong was this criticism, in fact, that the chief manufacturers have practically discontinued this form of racing altogether. This was a definite step in the right direction.

Probably no single factor ever brought the motorcycle into disrepute so strongly as the motordromes which were established in various parts of the country several years ago. The numerous injuries and deaths gained wide publicity, while the excessive noise created in the vicinity of the motordrome caused hundreds of people to gain a permanent and constant grudge against the vehicle. These were discontinued after a short time.

**But all of these things have had their part in building up prejudice and consequently sales resistance for the motorcycle outside of its narrow sporting field. This resistance, however, must be broken down if the industry is to permanently progress.**

Racing is a strong tradition with the motorcycle industry, and like many other traditions has survived in full vigor long after its former usefulness has passed. One reason for this may be found, perhaps, in the fact that more than one manufacturing executive has been very close to the thrills and joys of racing himself, and his memories of the exciting times of his old racing days are so pleasant and strong as to somewhat warp his perspective when attempting to view the industry from a purely business and merchandising point of view.

This is not an argument for the elimination of motorcycle racing. Motorcycle racing has and always will have a definite place. But it is getting far more than its fair share of attention and is the cause of more expense than its merchandising value warrants.

All of the factors thus far presented are recognized more or less by nearly everyone connected with the industry. Some of those who have thought most along these lines have some definite suggestions to offer. One point that is pertinent to any such discussion is that of the mechanical phases of the American motorcycle.

Let it be granted in the first place that the American motorcycle of to-day is a carefully built, quality machine, very powerful and rugged, capable of very high speed and of taking hills of nearly any variety, that there is a definite place for such a machine in this country where many roads are bad and where the rugged qualities are necessary. The very fact that there are 234,000 motorcycles in the United States shows that there is a definite market for machines of the powerful type, but the fact that the number is not increasing would indicate that the demand has been met.

The big manufacturers appear to have some similar thought, as is indicated by the introduction of middleweight machines by both Hendee and Harley-Davidson, while both of these makers now have on the market a single cylinder, though not a light weight machine, adapted to commercial use.

**Only a limited number of persons in any country need or desire a machine capable of going seventy miles an hour, and the opportunity for the utilization of the power of these big machines is also extremely limited.**

**If the field of the motorcycle is to be extended, it must be through the development of a machine more suited to the use of a greater number of persons. The heavy 15 to 19 hp. machines can not be operated with comfort by anyone except an athlete, while their initial cost and operating cost is comparatively large if they are to be used merely as a sporting proposition.**

**If a man desires a vehicle chiefly to take him from one place to another, he has no use for the high power and speed of the big machine and is not likely to pay the high price charged for it.**

One of the chief executives of one of the principal concerns said recently, "Frankly, this big machine is too hard to handle. I can't ride it myself any more."

In the mind of at least one concern is the idea that the future development of the motorcycle lies along the increasing use of the so-called middleweight machine. One of the executives of this concern stated that he believed the sale of this type of machine could be increased very greatly, especially among persons hitherto shy of the big machine. He thinks that the sale can be increased so greatly as to render real quantity production possible, with a consequent decrease in price, thus widening the market still further.

This view looks more nearly toward the direction in which the future development of the motorcycle is likely to be.

But even the so-called middleweight machines are good-sized motorcycles and sell at a price only slightly lower than the big machines. Thus the price is still high enough to make the motorcycle compete to some extent with the smaller automobiles. It is not a machine that is within the means of the man unable to buy a small car, who still desires a rapid means of individual transportation for himself.

There are three fields for development of the motorcycle outside of the sporting field:

1. Police and municipal work of various kinds.
2. Utility work, such as delivery for stores, etc.
3. Personal utility work: a vehicle for taking a man to and from work; to the store and back; and for short pleasure rides.

The first field is being cultivated intelligently and intensively by the manufacturers. Several large sales in this field were announced recently by one of the big companies and more will probably follow.

Some effort by individual dealers has been made in the second direction, but this field will bear more attention

than it has been given in the past. For certain reasons, however, it has definite limitations.

The third field is almost entirely undeveloped, although it probably constitutes the one great outlet for the progress of the American motorcycle industry. The potential field which it presents cannot be definitely calculated, but it is large.

For the first two limited purposes, as well as for sport, the present type of big and middle-sized machine is suitable. But for this last and very wide field, it is not suitable both because of its size and its cost.

**Manufacturers are wont to object that the light motorcycle is not feasible in this country because of the bad roads and because of the demand among our riders for speed and power. An analysis of the situation does not seem to validate this criticism.**

There is a demand among present riders for speed and power. But the whole point of this discussion tends to show that the very trouble with the motorcycle industry is its failure to develop and recognize the potential demands of a different class of possible riders. It must go forward into the development of this group or stagnate as a power and speed sporting proposition.

And the riders in this third class are largely those who could get great efficiency and usefulness from their machine, scarcely ever leaving a paved street or an improved road. It includes thousands of potential municipal buyers and of small town buyers who care a great deal for steady, constant individual transportation and not a tinker's darn for high speed and excessive power.

Some very definite opinions were expressed recently by a man who has been closely connected with the motorcycle industry since 1902, who is still connected with it and who has some rather frank statements to make in regard to its present and future status. While the writer does not specially wish to endorse these opinions, they undoubtedly contain much real food for thought and present an angle worthy of serious consideration and analysis by manufacturing executives coming as they do from one thoroughly familiar with conditions past and present. A part of what this man says is as follows:

". . . The fact is, the motorcycle business is very sick. A few million folks want a motorcycle, but not the kind factories insist on building. Those, and a few thousands more, who would take one of the present types, won't pay the price the factories demand.

"There will be nothing doing in a cut. The factories are going to stand pat and force the dealers to put it over at to-day's market. The dealers won't and can't.

"I've been in the game since 1902, and believe that I know some of the things that are wrong with it. I have gotten factory men to admit them, but they won't see the light and break away from customs.

"The crying need of the motorcycle industry is and always has been distribution. . . . this limited and fluctuating distribution is due to two things:

1. Refusal of manufacturers to produce a popular type of machine in volume.
2. The slow progress made, either in educating the low grade type dealer who predominates in the retail field or in replacing him with a better type of merchant.

"The motorcycle business needs a Ford or a Dodge; someone who appreciates the one model, volume and low price. They don't know the meaning of the word volume when they are content with 25,000 machines a year as a maximum; nor of the term 'popular price,' when they are charging $490 and $650. They don't know the meaning of the word 'standardization' when the big fellows are trying to build models to please everybody and get the other fellow's share as well as their own.

"The first necessity is a radical change in manufacturing policies, but I am convinced that this will not come from within the industry. It will have to be an outsider who comes in with an open mind, disregards the past and starts production on the type of machine the public wants, at a price which will appeal."

This from a man who has been in contact with the industry for 19 years as a department head in a large factory, as a member of a dealer organization, and as a constant motorcycle rider. It contains much that is worth thinking about.

The man who made these statements is wrong in implying that the present manufacturers do not have an open mind. There is probably no group of men who are striving more diligently toward the goal of achievement than the executives of the various motorcycle companies. It is with the idea of presenting some frank criticism to this open-minded group that this article has been written. To a group of any other kind, such criticism would be useless.

**An analysis of the entire situation, however, would lead to the belief that there is a call in the United States for a lighter, cheaper motorcycle, merchandised in a progressive and intelligent manner, the bad traditions of the industry being ruthlessly thrown away and the good traditions carried forward with renewed vigor. A summary brings out several important needs for the immediate future developments of the motorcycle industry:**

1. A careful, open-minded analysis of the broader possibilities for permanent progress.
2. Active co-operative effort on the part of all manufacturers together for the betterment and promotion of the industry as a whole.
3. Definite and immediate action in regard to raising dealer personnel, radical if necessary.
4. Intensive effort in the development of new sales fields, and care not to allow the traditional sporting and racing features of the industry to overshadow possibilities for future development in a manner out of proportion to their true importance.
5. A serious consideration of sales possibilities of a lightweight machine for general personal transportation purposes; and the production of a machine at a cost low enough to appeal to the man desiring such transportation but not financially able to pay for either a Ford or the present heavy or middleweight motorcycle.
6. The encouragement by manufacturers of frank constructive criticism by the motorcycle trade press; thus allowing the various companies to gain the benefit of candid suggestions from those in a position to view the industry as a whole.

This article has consciously refrained from discussing in detail the many good features of the motorcycle industry and the numerous constructive efforts which are being made within the industry for its betterment. These things are present in abundance. The article has assumed this and constitutes merely a friendly attempt to examine from an outside, though related, viewpoint the interested onlooker's analysis of the present status of the motorcycle industry. The purpose has been to criticize in a helpful way, but not to disparage in any sense the many constructive agencies now at work within the industry.

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ONE of the speakers on tractor subjects at the recent Columbus show said that a life of 7½ years of 45 working days can be conservatively figured on in connection with farm tractors, making the total active life of the tractor 337 days. The annual depreciation charge, therefore, is about 14 per cent of the cost price. In addition 4 per cent should be allowed for repairs.

## Kinship of Aircraft and Automotive Industries

*Editor* AUTOMOTIVE INDUSTRIES:

I think all of us who attend meetings of the S. A. E. are always vividly impressed while attending them with the close inter-relationship between all branches of the automotive industry. I also fear that as the memory of these gatherings becomes more dim that very important impression does likewise. Therefore, I think that a good technical publication like AUTOMOTIVE INDUSTRIES is doing a real favor to all of us when it comes around with a reminder that we all belong in the internal combustion family.

At last winter's session there were a few of these impressions that I determined not to forget. One was that I am interested in fuel, that I wanted to attend the fuel session, that I could not attend it because of simultaneous meetings on other subjects, and that I must read the proceedings of the fuel session. I also was equally impressed with the fact that fuel men should attend the aeronautical session and if simultaneous meetings made it impracticable they should read what we did. To further illustrate this inter-relationship, let me recall the statement of a well known automobile engineer who sat next to me during the general meeting. "Of course I am interested in aeronautics, especially in the engines," he said. "The designers of aviation engines are doing things all the time that I ought to know about, and I am equally sure that a lot of the research work going on in the other branches of the industry would be of real value to the designers of aircraft engines. The same is true of airplane engineers and chassis and body builders—not that a body builder can work directly from a plane design, but there is a lot of detail research work which should be of real use to him." Another engineer, who was listening to the above conversation, remarked that he was attending the aeronautic session because some day he might be building aviation engines himself, and it is a fact that it is the belief of some of the best engineering minds in the world that co-operative thought will lead to the best development and that there is every reason to think that the automobile industry itself may be very directly affected to its advantage by the development of aircraft, especially along commercial lines.

Later on, outside, we discussed this same question and the consensus seemed to be that many members of the S.A.E. hardly realize the really intimate relation between flying and the automobile. Aircraft will never take the place of the automobile, but there will grow to be a more and more intimate relation as time goes on and it is certainly to be hoped that the automobile engineers as they go back to their own work will not forget all about the youngest member of the family, because some day they may have to go into partnership with him. Builders of automotive apparatus are very short-sighted if they do not realize that the time will come, and that sooner than many of them think, when there will be a great passenger and fast express service by lighter or heavier than aircraft. As an analogy, one famous builder of carriage bodies has said that as early as 1898 he began to work on designs for automobile bodies and he certainly profited by his farsightedness. In the same way we all know how some of the great bicycle manufacturers were interested in the automobile game and one at least of these men devoted a great deal of his time and energy to good roads campaigns, not only on account of his bicycle business, but also because of his farsightedness in looking ahead to the time when the automobile's popularity would depend on good roads. Many men at that time, and some of them even own up to it now, thought that these manufacturers were almost insane when they began to play with what was thought to be at that time a toy—"the horseless carriage." Yet to-day the proportion of carriage bodies built is very small indeed compared with the automobile bodies turned out. Those who remember far enough back can trace the development of some of the great automobile concerns of to-day from the experiments of those early pioneers in the bicycle business.

A great number of automobile concerns became interested in aeronautics during the war, but almost all of these have at the present time apparently dropped all thought of aeronautics, and, while no one can believe that aviation is the panacea for all transportation evils, still the automobile engineer whose thoughts trend along aeronautic lines and who keeps in touch with the game as it is to-day, and who goes further than that and does a certain amount of research and perhaps experimentation is laying the foundation for the future which will well repay his foresight.

The great basic difficulty now is the lack of any Federal control of construction and of flying in the United States. There are no great number of real landing fields, but given the proper legislation to prevent freaks from injuring the development of the industry and unsound fliers from injuring themselves and others, landing fields will come and the aeronautical industry will develop like a plant in good soil which is properly cared for. The automotive industry at large can be of the utmost assistance to aeronautics by lending its powerful influence to the solving of the basic problem of legislation, and to quite as great an extent by giving its thought toward the solution of the many technical problems which confront the art to-day. Many of these technical problems could have real light thrown on them by their being attacked from the entirely outside and fresh viewpoint of men who have not been so close to the industry that they have difficulty in viewing the matter as a whole. Experimental work may be considered too great an expense. If so, an automotive concern might do two things: (1) conduct the experimental work on paper, or (2) induce the Government to bear the expense. In several instances (all too few as a matter of fact), the Government has let contracts to the automotive industry to build experimental jobs, though most work of this type is conducted at McCook Field in Dayton. With the entire industry interested in aeronautics more of this work undoubtedly would be placed with the industry. The automotive industry had, before this country got into the war, a few men who were farsighted enough to see the tremendous benefit this industry could be to aircraft as a whole should the emergency arise and when

this country did get into the war it had to call on the whole industry. If it had not been for the automotive industry this country would have been in a particularly helpless condition, so far as aircraft went, and although it is to be definitely hoped that should we have to go to war again the aeronautical industry will be sufficiently on its feet to give a good account of itself, undoubtedly more or less help would have to be obtained from the great automobile and body building plants.

Therefore it behooves the industry at large to keep an eye on aeronautics and to keep itself in a position where, if the emergency arose, there could be an instant response which would give this country a strength potentially and actually which it could not otherwise have.

This whole thought goes back fundamentally to the basic idea of the industry—the whole automotive industry is one family—the internal combustion group, and, while it is impossible to tell at the present time where the family is going to, it is certainly on its way.

JOHN R. CAUTLEY.

## Passenger Car Displacement Per Ton-Foot Basis

*Editor* AUTOMOTIVE INDUSTRIES:

Your article in the March 3rd issue of the AUTOMOTIVE INDUSTRIES is the best exposition of the subject that has ever been presented and, covering as it does practically all passenger cars, is of very great importance and enables a fair comparison to be made of the ability and merits of all the cars.

In the classification that appeared in your Statistical Number, and which also was very complete as regards the details generally, there was lacking the total weight and the pay load or live load that are necessary for making a comparison of the merits of the various cars, and you have now worked these out on a basis fair to all the makers and in a form that can be seen at a glance.

Might I suggest that a similar procedure be followed with reference to the classification of gasoline trucks that also appear in your Statistical Number, so that similar knowledge can be gained with regard to the motor trucks? There are so many of these (over 500), I appreciate this may be quite a task, but this condition might be met in part by taking say, 100 to 200 of the leading makes and comparing these, as they would probably represent the entire number, most of which are in small production.

In this connection, also, the live load or **rated pay load** should be given for each truck, and the displacement per ton-foot should also be given on the basis of **pay load** as this is what is wanted in the final analysis. There is no other means of knowing whether the pay load is 20 or 50 per cent of the total weight. This pay load varies greatly in the various trucks, and in a tabulation comprising 219 trucks, which was recently shown me, the pay load ran from 18 to 50 per cent and therefore the user had no means of knowing whether he was carrying around 5 pounds of dead load to one pound of pay load or 2 pounds of dead load to 1 pound of pay load (which greatly affects the efficiency of the trucks).

Reverting now to the table on page 495, the final analysis should be on the pay load or live load and based on the 150 lbs. per passenger that you have assumed. The first car given in your list carries only 4 passengers or 600 lbs. pay load for 4670 lbs. total weight or, say, 12.9 per cent pay load; therefore, the cubic inch displacement per ton-foot pay load becomes 192; further, for the last car in your table, Piedmont 4-30, carrying 34 per cent pay load, it becomes 138, and, similarly, for the Ford, carrying 31.8 per cent pay load, it becomes 110. Of course, I recognize that it is not quite fair to compare the lightest and the heaviest cars, and in order to make a fair comparison these cars, which are generally spoken of as light, medium or heavy, should be compared in their various classes and as a basis of comparison it is suggested that these might be classified on their loaded weights as follows:

| Light | Medium | Heavy |
|---|---|---|
| Under 3000 lbs. | 3001-4400 lbs. | 4401-8800 lbs. |

On this basis we get the following results:

LIGHT WEIGHT CARS

| Name | Cubic Inch Displacement Per Ton-Foot | Per Cent Pay Load | Displacement Per Ton-Foot Pay Load | Index Figure* |
|---|---|---|---|---|
| Seneca | 28.5 | 25.5 | 112 | 1.02 |
| Harroun | 29.7 | 25.0 | 119 | 1.08 |
| Nelson | 30.2 | 20.0 | 150 | 1.37 |
| Overland | 31.0 | 28.3 | 110 | 1.00 |
| Ford | 34.6 | 31.7 | 110 | 1.00 |
| Leach | 34.9 | 28.0 | 124 | 1.13 |
| Piedmont | 47.0 | 34.0 | 138 | 1.26 |

MEDIUM WEIGHT CARS

| | | | | |
|---|---|---|---|---|
| Monroe | 24.7 | 23.0 | 108 | 1.00 |
| Norwalk | 25.1 | 18.0 | 140 | 1.30 |
| Friend Four | 25.8 | 23.5 | 110 | 1.02 |
| ——— | 26.0 | 21.5 | 121 | 1.13 |
| Reo | 28.0 | 19.0 | 147 | 1.36 |
| Liberty | 28.5 | 21.8 | 130 | 1.20 |
| Tulsa | 28.8 | 20.5 | 141 | 1.31 |
| Lexington | 28.8 | 24.5 | 118 | 1.09 |
| Essex | 28.9 | 21.8 | 132 | 1.22 |
| Saxon | 29.0 | 21.5 | 135 | 1.25 |
| Cleveland | 29.2 | 21.6 | 135 | 1.25 |
| Briscoe | 29.6 | 23.3 | 127 | 1.17 |
| Templar | 29.6 | 17.3 | 172 | 1.60 |
| Commonwealth | 29.7 | 23.5 | 126 | 1.17 |
| Kline Car | 29.8 | 20.8 | 136 | 1.26 |
| Skelton | 30.7 | 23.6 | 130 | 1.20 |
| ——— | 30.7 | 20.3 | 150 | 1.39 |
| Noma | 30.9 | 19.4 | 158 | 1.46 |
| Buick | 30.9 | 20.0 | 154 | 1.43 |
| Hatfield | 31.2 | 21.8 | 147 | 1.36 |
| Hupmobile | 31.3 | 22.2 | 142 | 1.31 |
| Dixie Flyer | 31.4 | 22.0 | 143 | 1.32 |
| Allen | 31.5 | 22.2 | 142 | 1.31 |
| Paterson | 31.6 | 20.4 | 155 | 1.44 |
| Scripps-Booth | 31.7 | 23.0 | 138 | 1.28 |
| American | 31.8 | 17.8 | 178 | 1.67 |
| Elcar | 32.0 | 20.5 | 156 | 1.45 |
| Oldsmobile | 32.0 | 21.5 | 149 | 1.38 |
| Grant Six | 32.1 | 21.8 | 147 | 1.36 |
| Globe Four | 32.2 | 23.0 | 140 | 1.30 |
| Gardner | 32.4 | 23.3 | 139 | 1.28 |
| Dodge | 32.5 | 23.0 | 141 | 1.305 |
| Lorraine | 32.8 | 23.0 | 142 | 1.31 |
| Wescott | 32.8 | 19.0 | 173 | 1.62 |
| Auburn | 33.2 | 20.25 | 164 | 1.52 |
| Holmes | 33.3 | 25.2 | 132 | 1.22 |
| Moon | 33.3 | 20.0 | 166 | 1.54 |
| ——— | 33.4 | 20.0 | 167 | 1.55 |
| Jordan | 33.6 | 20.2 | 167 | 1.55 |
| Maibohm | 34.0 | 24.30 | 140 | 1.30 |
| Nash | 34.0 | 19.6 | 173 | 1.62 |
| Piedmont 6-40 | 34.5 | 21.5 | 160 | 1.48 |
| Pilot | 34.8 | 19.5 | 178 | 1.67 |
| Sayers Six | 34.8 | 21.2 | 164 | 1.52 |
| Paige G | 35.2 | 19.4 | 180 | 1.68 |
| Metz Master Six | 35.5 | 20.6 | 172 | 1.60 |
| Elgin | 36.9 | 21.5 | 171 | 1.59 |
| Chandler | 37.0 | 25.0 | 148 | 1.37 |
| Meteor | 37.5 | 14.1 | 265 | 2.55 |
| Crawford | 38.9 | 18.2 | 213 | 1.98 |
| Bour Davis | 40.4 | 19.2 | 210 | 1.95 |
| Davis | 41.7 | 20.5 | 203 | 1.89 |
| Franklin | 42.2 | 23.5 | 179 | 1.65 |
| Severin | 42.6 | 20.0 | 214 | 1.98 |

*This index figure is obtained by dividing the corresponding figure under displacement per ton-foot pay load by the lowest figure under the same head in same weight class.

HEAVY WEIGHT CARS

| Name | Cubic Inch Displacement Per Ton-Foot | Per Cent Pay Load | Displacement Per Ton-Foot Pay Load | Index Figure |
|---|---|---|---|---|
| ——— | 24.6 | 12.9 | 192 | 1.57 |
| Stephens | 28.2 | 23.2 | 122 | 1.00 |
| Dorris | 28.6 | 20.6 | 139 | 1.14 |
| Cadillac | 29.0 | 20.5 | 142 | 1.16 |
| Brewster* | 29.2 | 17.0 | 188 | 1.54 |
| Marmon | 29.9 | 21.25 | 140 | 1.15 |
| National | 30.2 | 21.5 | 141 | 1.155 |
| Daniels | 30.3 | 17.2 | 176 | 1.45 |
| Rock Falls | 31.2 | 21.3 | 147 | 1.20 |
| Roamer | 31.9 | 17.0 | 188 | 1.54 |
| Porter | 32.0 | 19.8 | 162 | 1.33 |
| ——— | 32.4 | 17.8 | 181 | 1.49 |
| Standard | 32.6 | 21.2 | 154 | 1.27 |
| Winton | 32.7 | 20.2 | 162 | 1.33 |
| Apperson | 33.2 | 22.2 | 150 | 1.23 |
| Hudson | 33.2 | 22.0 | 151 | 1.24 |
| ——— | 33.3 | 17.2 | 193 | 1.58 |
| Ferris | 33.6 | 20.5 | 164 | 1.34 |
| ——— | 34.4 | 16.25 | 212 | 194 |
| Case | 35.2 | 22.3 | 159 | 1.30 |
| Cunningham | 35.5 | 18.8 | 189 | 1.76 |
| Lincoln | 36.0 | 14.6 | 245 | 2.02 |
| Page L. | 36.4 | 21.8 | 166 | 1.37 |
| King | 36.6 | 23.3 | 158 | 1.30 |
| Peerless | 36.7 | 21.2 | 168 | 1.38 |
| Cole | 37.0 | 21.7 | 170 | 1.40 |
| Lafayette | 37.2 | 15.4 | 242 | 1.99 |
| McFarlan | 38.1 | 17.2 | 222 | 1.82 |
| Stevens-Duryea | 38.8 | 18.6 | 210 | 1.72 |

*Correction: In figuring the original table from which this tabulation is made the displacement of the Brewster engine was given as 376.5 instead of 276.5 cu. in. the correct figure, due to a typographical error. This makes the displacement per ton-ft. 29.2 cu. in. instead of 39.4 the figure originally given.—Editor.

By taking the highest efficiency in each class as unity (1.00) the relative efficiencies can at once be compared and the importance of the percentage of live load becomes apparent and generally the higher this pay load percentage the more economical the car, but it does not always work out that the lightest car is the most economical.

As regards the cubic in displacement per ton foot, no account is taken of the relative economies of the different engines, and this result may be attained very much more economically in one car than in the other, so that the real economy in gasoline per mile may be very much different than that indicated in your table. Take the Franklin car, for instance, which is at the very top of your table; it is claimed, and presumably admitted, that this car gives a very high mileage per gallon of gasoline and in the above table giving the relative economies it does not work out very well and shows 179 per foot-ton of pay load although its weight is quite low.

With reference to your comparison with the small Fiat car, is it exactly fair to compare this with the average American car? This car is lighter than the Ford and really belongs in the light car class, but as regards cubic inch displacement per ton-foot it does not show up as well as the first two at the head of your list. You do not state the number of passengers carried but I understand this car is designed for four passengers or 600 lbs. and on this assumption the pay load is 28 per cent, giving an efficiency of 98 as compared with 110 for the Ford.

In making all the comparisons it must be borne in mind that in all the larger and refined cars weight per se is not the consideration but riding and other qualities.

**Medium Weight Cars:** The weight given for the Buick car is wrong and should be 3750 lbs. and not 2700 lbs. The weight of the Oldsmobile car is 3450 lbs. and not 3900 lbs.

**Heavy Weight Cars:** The weight of the Brewster car is 4450 lbs. and not 4850 lbs. as given in your table.

W. J. P. MOORE.

In determining the cu. in. piston displacement per ton-ft. for the different makes of passenger cars we did not intend it as a figure of merit or of efficiency, because as applied to automobiles these terms have a very vague meaning. The index figures given in Mr. Moore's table are not correctly termed relative efficiency. They are the ratios obtained by dividing the displacement per ton-ft. pay load of each car by the lowest displacement per ton-ft. pay load of any car in the same weight class.

Our object in preparing the original table was to show what is being done by engineers in powering their cars or in making a compromise between the requirement of fuel economy on the one hand and high acceleration on the other.

While the ratio of pay load to total load has a great influence on the economy of a car on the passenger-mile cost basis, combining this figure with the cu. in. per ton-ft. confounds two quite different things. Of course, the economy of the car as a transportation unit should bear a close relation to the index figure calculated by Mr. Moore.

We doubt whether there would be much value in a table showing the cu. in. displacement per pay ton-ft. of different trucks, for the reason that the rated load capacity of a truck is an arbitrary figure. To illustrate what we mean, let us say that a certain truck has been sold for a number of years as a 2-ton. Now competition becomes exceedingly keen and the manufacturer believes he can "get away with" a 2½ ton rating, so he announces the truck as a 2½ ton model. This would greatly increase Mr. Moore's efficiency figure for the truck but it would not add one iota to its real merit.

In making the comparison with the Fiat small car it was not our idea to show that this car was superior to American cars generally. We reasoned that inasmuch as gasoline is exceedingly expensive in Italy and this is a very small car and therefore undoubtedly designed for economical operation, the powering (that is, the cu. in. per ton-ft.) is probably as low as considered possible in a practical machine by the designers, and that the figure arrived at for this car therefore constitutes apparently the limit beyond which it is impractical to go in seeking for economy.

The weight figures were those given us by the manufacturers with the passenger weight added by us. We requested the manufacturers to give us the weight of the car in running condition with tanks full. As long as the displacement figure is reduced to 4, the unit of total weight of car and load, it makes very little difference whether the passenger weight is assumed to be 150 or 200 lbs.—Editor.

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IN a review of the recently issued volume, "How to Keep Invention Records," in AUTOMOTIVE INDUSTRIES for Jan. 27, the name of the author was inadvertently omitted. The book was written by Harry A. Toulmin, Jr., J.D., Litt.D., a patent attorney. The introduction is by James T. Newton, former U. S. Commissioner of Patents. The volume is published by D. Appleton & Co.

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IN a recent paper read before the graduates section of the Institution of Automobile Engineers the statement was made that it was quite useless to drill the oil scoops at the bottom of the connecting rods, as the centrifugal force was so much greater than the inertia force that no oil could possibly be thrown up on to the pin from the scoop. The scoop was to create an oil mist.

# Exported Cars Are Making Market for Parts and Equipment

**Increased trade, due to pioneer sales, is making itself apparent in the monthly reports of sales to the various countries of the world. The January figures illustrate this point by totals that run well over previous figures. Increased business in both pneumatic and solid tires. British hope to regain New Zealand motor trade.**

THE thousands of automotive vehicles—cars, trucks and tractors—exported from the United States in 1920, as well as those of previous years, are making excellent markets for equipment and accessories in all countries of the world. That is nowhere more strikingly shown than by the export figures from this country for the month of January, the last for which official totals are obtainable. These show that the foreign shipments for that month were 136 per cent of the monthly averages for 1920 and 208 per cent of the business that was done in the same lines in January, 1920. The respective figures are:

| | |
|---|---|
| Parts and equipment exports in January, 1921 | $9,679,295 |
| Parts and equipment exports in January, 1920 | 4,649,192 |
| Parts and equipment exports monthly average twelve months of 1920 | 7,113,507 |

The significance of this to the manufacturer and exporter is that the cars and trucks sold last year are needing equipment. These cars, as in the United States, were put to work when they were sold in Asia, Africa, Latin-America, Australia, Europe and elsewhere. When the business depression came, they were not scrapped, regardless of what may have happened to the sale of new vehicles. They were kept running and to-day they are in need of spark plugs, windshields, magnetos, covers, pistons, piston rings, horns, lamps, batteries and all that class of automotive parts which must be replaced from time to time.

Tires make up another item which should be included in this list. They are not, however, shown in the tabulation just given. But exporters and tire manufacturers report increased business on both pneumatics and solids. This is natural, when it is remembered that more than 142,500 passenger cars and 29,000 motor trucks (as well as 24,000 motor cycles) were shipped from the United States to various foreign countries last year and that, in addition, thousands of other cars and trucks were built during the year in the branches maintained by Henry Ford in Canada, Argentina, Brazil, England, Spain, France and Denmark which do not show in the export statistics but which require American equipment.

A tabulation of the leading countries in the January parts exports, not including tires and engines, shows the following to have been the leading countries:

| | | | |
|---|---|---|---|
| England | $2,617,307 | Australia | $194,819 |
| Argentina | 1,610,061 | Brazil | 170,069 |
| Denmark | 844,353 | New Zealand | 130,031 |
| France | 758,624 | Philippines | 109,550 |
| Canada | 729,706 | British South Africa | 87,588 |
| Spain | 370,393 | Chile | 62,677 |
| Mexico | 243,597 | Uruguay | 61,396 |
| Dutch East Indies | 239,372 | Peru | 53,751 |
| Cuba | 222,546 | | |

### New Zealand Problems

THE Wellington, New Zealand, correspondent of the London *Times*, in a lengthy survey of the local motor trade, discusses factors that are handicapping the development of the trade. Summarized these factors are:

Reduced price for wool, uncertainty in trade generally, unfavorable attitude of the banks toward the motor trade in particular—apparently the bankers regard the trade as almost wholly a pleasure giving, joy riding business—and the unfavorable rate of exchange. He thinks that the British and the European car makers are likely to recover the market, but points out that manufacturers who wish to increase their standing in this market will need to be familiar with the character and varying conditions of New Zealand roads, and that gasoline is not only dear but at times scarce. In effect these two conditions emphasize the need for gasoline economy, a light tare and big tires.

Another point noted by the New Zealand writer is that the trend is toward heavier and larger capacity motor trucks, which are found to stand up better under the road and local usage conditions.

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### Suggestions As To India

THE British Trade Commissioner in India, T. M. Ainscough, recently offered the following suggestions to the British motor trade for working the Indian market. He advised that branches be opened in Calcutta, Bombay, Madras and Lahore, each furnished with a stock of chassis and spare parts and a well equipped garage and workshop for the execution of all repairs and body-building. Each depot should be staffed by an experienced sales manager, three or four European mechanics, trained in the home factory, and two good touring salesmen. In addition agents should be appointed in Cawnpore, Allahabad, Rawalpindi, Peshawar, Delhi, Bangalore, Nagpur and Rangoon.

An alternative method recommended is the nomination of one of the well-known motor importers as representative in India, or the appointment of a good house in each center. The maker should also send out a few salesmen and half a dozen mechanics.

With regard to the types of vehicle for which there is likely to be an increasing sale, trucks merit first attention. Light trucks for merchandise service in and around cities are in demand, and would sell in greater numbers if transport companies were organized. Their use for mail collection is likely to grow.

Of heavy trucks, the prospects for sales are considered excellent. Their use in transport between the plains and the hill stations is growing, and municipalities are large

buyers. On the cotton plantations trucks are replacing the bullock cart. It is thought that they will be brought into extended use as feeders for the railways and may supersede the light line.

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### Notes On Swedish Trade

IN an article contributed to a recent number of the *Swedish-American Trade Journal*, S. A. G. Swenson contributes some very interesting facts concerning the trade in Scandinavia. Swenson, according to an identification note, has been active in establishing dealer outlets for American cars in Northern Europe.

He reviews briefly the boom in the automotive trade following the armistice and says that the orderly progress of this trade was somewhat interfered with because the Germans offered some cars and trucks there at low prices. Then he says:

"Several companies in Scandinavia are now under 'reconstruction.' However, the old established real dealers and a few new ones who knew the business and stuck to it have not been much affected by the present readjustment; they are well established, have good lines to sell, and know how to market them. Some dealers, though, have heavy stocks being carried over the winter and naturally do not want to contract for this year.

"Sweden imported 9061 automobiles, valued at 54,200,000 kronor, from all countries during January-November, 1920. In the corresponding period of 1919 the number was 2440, valued at 12,500,000 krona. The United States exported during the eleven months of 1920 5294 cars to Sweden, valued at $6,643,617, while Norway and Denmark took 3182 and 1074 respectively."

Swenson then lists 51 American passenger cars that he knows were being sold in Sweden with 24 European cars. As to Swedish made vehicles he says:

"The Scania-Vabis, made by the Scania-Vabis Co., is a Swedish product. This company, however, specializes more in high-grade motor trucks. Another Swedish car, the T. V., in the light class, is manufactured by the Thulin Works, with a present output of one car per day. This company also planned to produce the T. V. motorcycle."

In discussing trade methods, Swenson says:

"With regard to export houses, it is true that a manufacturer can have advantage of operating through such a distributor, as he should thus be assured of immediate payment and relieved of a great deal of responsibility in connection with service, and furthermore, one can expect that the export house should be better posted on foreign conditions by having representatives stationed abroad, but unless the export house has a financial interest in the foreign firm the method is impractical, and it is evident that dealers on the other side have become skeptical of export middlemen and prefer direct factory connections.

"The Swedish territory is in some cases handled from Copenhagen or Christiania. With due respect to the Danish and Norwegian merchant it must be said that it is not wise to place an agency for Sweden with a dealer domiciled in either city. Scandinavia is a name for three separate states and Sweden is, by the way, the largest and uses the most motor cars.

"As an example we may mention that the Norwegian, Swedish and Finnish agency for a well-known French car was given to a firm in Christiania. The reverse procedure is not entirely satisfactory either. For example, a light American car is handled for the whole of Scandinavia by a dealer in a provincial town in Northern Sweden. Most of the large dealers have as much as they can handle, and it is good business ethics to help the small dealers, but it would be better for the manufacturers to have such agents act as dealers for their respective countries. Arrangements of this kind have sometimes been made because the manufacturer did not find better connections, but in the majority of cases he was ignorant of the market, or did not care because his ability to deliver cars was limited.

"The Norwegian market is smaller than that of Sweden, but it is a fact that Norway is more aggressive than Sweden in the matter of good American products. The cars one sees in Christiania are practically all American. It is interesting to compare the automobile lines introduced in Sweden with those in Norway and Denmark. There are approximately 50 American and 25 European lines in Sweden, of which about 26 American and 3 European are also represented in Norway, and 33 and 10 respectively in Denmark. On the other hand, Norway and Denmark have certain lines that are not handled by Swedish dealers, namely Norway 15 American and 7 European, and Denmark 10 American and as many as 35 European."

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### Spark Plugs In Argentine

AN estimate is made by Vice Consul Harold C. Waters, of Buenos Aires, that 600,000 spark plugs are sold annually in the Argentine Republic, and he believes that at least 75 per cent of them are of American manufacture. This coincides with an estimate of 75 per cent, by Consul Ezra M. Lawton, of Sao Paulo, Brazil, as being the percentage of American made plugs sold in Brazil.

The Argentine market, however, is being entered by an increasingly large number of European manufacturers, who have recently brought in the following brands: German, Bosch; English, Lodge and Hobson; French, Oleo-Magneto, Pognon, Apollo, and Hauquaire. The foreign brands are made only in metric dimensions, whereas many American makers sell both the standard American and the metric sizes. Both Consul Waters and Consul Lawton agree that the more satisfactory manner of packing is to have each plug in a separate cardboard box.

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### Foreign Trade Financing Fund

WITH regard to the effort being made to finance The Foreign Trade Financing Corp., automotive manufacturers should always keep in mind that it is the intention of the heads of this corporation to assign this money to use according to the source. Thus, if the automotive industry is a large subscriber to the stock of the corporation it will have a large share of the available funds placed at its disposal. The sale of stock is said to be progressing at a satisfactory rate.

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### Red Sea District

THE possibilities of automobile sales in the Red Sea commercial district, of which Aden, Arabia, is the center, is discussed by Addison E. Southard, American consul at Aden, in the Feb. 21 report of the Bureau of Foreign and Domestic Commerce. "The Aden Red Sea district may be considered as having immediate possibilities as a limited market for motor vehicles," the Consul declares.

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### Tractor Future In Australia

AN Australian correspondent in an article emphasizing the need for suitable settlers in Australia chiefly as a measure of protecting the British Empire, states that of 200,000,000 acres of arable land, only 12,500,000 are being cultivated. The fact suggests an immense scope for tractors and power farming plant, which Great Britain cannot possibly meet under present conditions of tractor enterprise; the Austin and Fordson outputs being the only ones of any numerical value.

# The Trend Toward Decentralization in Organization

**The trend toward decentralization may become as much of a fetish as did centralization some years ago. The minimum amount of system necessary to prevent confusion is probably the ideal. Upon the intelligence of the individual depends largely the amount of system necessary.**

By Harry Tipper

SOME of the industrial engineers who have been engaged upon meeting the problems arising out of production in a good many different lines of industry are beginning to talk of the necessity of decentralizing in the large industrial organizations, in order to secure the progress in effective work which must be secured in the future. They contend that we have established so many special departments for the general standardization of system within the plant, and so much overhead organization has been created through this development, that too much responsibility has been taken away from the foreman and the sub-foreman. We have attempted to reduce the necessity for the individual judgment of the foreman in order to provide a system which would facilitate mass operation without confusion.

In doing this some of the engineers contend that we have gone too far in that direction, and that we should give the foreman a larger opportunity to control his own department. By these means they expect to render the system more flexible, to improve the executive capacity of the foreman and to reduce the overhead by simplifying the special departmental requirements.

**The value of this contention cannot be practically determined at the present time, because experiments in decentralizing have not been carried sufficiently far to make any conclusions permissible. It is quite possible, however, to centralize so much in the hands of special departments that the efficiency is not increased by the increase in specialization. There may be a drop in efficiency due to the tendency for all such departments to enlarge their own technique and their own technical detail, without any thorough understanding of the value of that technique to the general establishment.**

**We are wise enough to know that the possibility of human error requires a tolerance allowance in the actual production work, but we do not always follow the same precedent in dealing with system and methods of operation.**

Not long ago I was consulted about a proposed change in the system of operating one of the special departments of a fair-sized plant. It seemed that some errors were discovered in the operation of the system and the changes were intended to remove those errors. A little examination showed that the total number of errors discovered represented less than one per cent in proportion to the total operations of the department. The changes in the system meant an addition of five people to the personnel of the department.

Five more people meant an additional possibility of the human error, because every new motion necessary in the conduct of the system added a new possibility of error in each motion to be made. Unless the new checks and balances would remove a large proportion of the original errors established, the addition of more system could be expected to lessen the efficiency, because it increased the number of places where error could creep in and the number of motions where a mistake could be made.

Under the circumstances, my judgment was that the changes in the system were unwarranted by the conditions; that they would bring no observable improvement in accuracy; and that they would probably lead to a decrease in accuracy due to the larger possibility of human failure.

In an establishment with which I was well acquainted some years ago, the manager of one of the special departments became so interested in securing accuracy of records and conditions, that his department was enlarged with great rapidity in order to analyze the items, check the conditions and balance the results. After a number of years, a change was made in the management of that department. The new manager operated with 50 per cent of the personnel and the observable errors were not increased by this reduction of the system.

**The first manager had become so interested in securing accuracy for the sake of securing it, he had forgotten that an unusual degree of analysis in his department could not have any bearing upon the total result because the extra accuracy secured in that department was lost in the relative approximation required in the work of other branches of the operation.**

We are constantly referring to the red tape which surrounds the governmental departments, which makes it so difficult to do business with any satisfaction. These governmental departments are limited by the laws, precedents and rules which have been established from time to time for the protection of the public, for the definition of responsibility or for the extension of the system. While it is not visible to the same degree, there is a tendency for the system in its detailed technique to evolve a lot of unnecessary motions in many of the special departments in the large industrial establishments in this country. This leads to a bureaucratic condition, within the departments themselves, and the elevation of a rule to a principle so that it cannot be disturbed and must travel its accustomed way, whether that method answers the purpose most effectively or not.

Some of these things had been observed by intelligent engineers in their study of plans under different conditions and with different operations, and they have led to the talk about decentralization which threatens to become as much of a fetish as centralization did some years ago.

**The minimum amount of system necessary to prevent confusion is probably the ideal amount of system. The practical amount of system is dependent upon the measure of intelligent understanding possessed by all supervisors. If we are willing to spend the necessary time and effort to educate supervisors, instead of obliging them to educate themselves in the inefficient and fragmentary way in which this education must be secured, we will be able to give all supervisors a larger measure of responsibility, simplify the work of the special departments without losing any of the required standardization.**

The present tendency to inflexible routine in the special departments would be eliminated or reduced, because it would be checked constantly by the practical understanding of the supervisor who was permitted to exercise his responsibility in connection with it. Mostly, the human errors are due to lack of interest and misunderstanding, and no system based upon these deficiencies will eliminate the errors. Systems, which run wild in their accumulation of technical detail for the purpose of eliminating error, are quite likely to enlarge it and to add to the cost burden under which the establishment labors.

**For a considerable time we have paid some attention to training the skilled worker in his job, and a lot of time and thought has been given to the education of the salesman and the office force. It will pay us to spend some time on the education of the men responsible for production, and we should be able to eliminate a lot of cumbersome special systems when we have been at that work for a reasonable period.**

The development of theoretical education along with practical education for the foreman, which has been taking place in the last year or two, is an excellent sign. No development is more greatly needed in the improvement of production efficiency. It will be accelerated if we study the systems we at present employ, find out from the foreman and the other supervisors the difficulties and troubles which arise out of these systems and take into serious consideration the question of simplifying them by permitting the supervisors a larger degree of responsibility in connection with them.

# Instincts and Incentives

THERE are various instincts which make men work. There is often a more or less direct relation between the instinct which motivates the worker and the quality and quantity of work produced. This fact should be more generally recognized, since its importance increases directly in proportion to the length of time over which it operates.

In other words, fear of losing his job may drive a man to extended effort for a short period of time, but if no other incentive to work is ever provided, other instincts, such as hate and distrustfulness, come into play and are almost sure to overcome the fear of losing his job. The growth of these other instincts among many individuals combine to produce industrial inefficiency and in the long run industrial chaos.

What little data is available as the result of experiments tends to show that men urged by the better instincts of pride in workmanship, ambition and desire for service, as well as by desire for money and fear of unemployment, will produce work of greater quality and quantity over any considerable period of time.

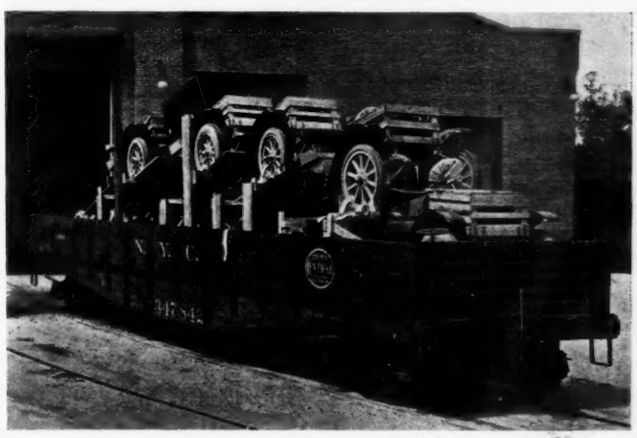
All these factors should be considered when discussing the matter of better workmanship and the providing of incentives. A recent pamphlet published by the Cleveland Chamber of Commerce entitled "Employees' Incentive Plans in Cleveland Industries" divides the plans discussed into four classifications: profit sharing plans, limited profit sharing plans, bonus plans and stock sales plans.

Examination of this classification brings out the fact that every one of these incentives appeals to a single instinct, the instinct for monetary gain. It is undoubtedly true that an appeal to this instinct is likely to play an important part in many successful incentive plans. But it is significant that all the plans noted appeal almost entirely to this instinct. The term "incentive plan" must be supposed to have a very narrow definition if it is to refer only to money incentives.

A broader interpretation of the term is necessary and a wider group of instincts need to be considered if permanent progress is to be made along these lines. And it is very desirable that the study necessary to such progress be pushed forward as rapidly as conditions permit.

## Commercial Vehicles of Great Britain

A COPY of the second edition of a book of specifications of British commercial motor vehicles, published by the B. F. Goodrich Co., Ltd., of London, under date of 1920, has just come to hand. Specifications of forty-four different makes of vehicles are given, including trucks, tractors and sight-seeing buses as well as vehicles of all three motive powers. There are articles on A Standard System for Recording the Operating Costs of Commercial Vehicles, Lengthening the Life of a Motor Vehicle and Relation of Tire Equipment to Cost of Maintenance of Commercial Motor Vehicles. Besides the book contains useful information on British tire standards, British commercial vehicle associations, etc.



*How the White Co. is saving freight car space*

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE
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# Government and Business

THE announced theme of the Ninth Annual Meeting of the Chamber of Commerce of the United States indicates that the meeting will be an interesting and profitable one. The theme is:

"In the public interest; more business methods in business, less government management of business."

The advance notice of this meeting states that all questions to be brought before the meeting will be approached as they relate to the general theme. If this program is carefully and intelligently followed, the gathering of business men at Atlantic City April 27 to 29 should do much to solve many of the minor, but perplexing troubles of business. There is and must be such an intimate connection between government and business, especially while heavy taxes are necessary to clear up the war expenses, that almost any new undertaking is considered from this point of view.

Many business men are hopeful that the present administration will take long steps toward injecting the business idea into government. This hope has been increased by the news that Secretary of Commerce Hoover is consulting frequently and frankly with business men. He is hearing the views of men who are successful in private business and is letting them pass on his ideas. It goes without saying that these men will reach a common idea in these meetings, for both sides are approaching the questions with a view of being mutually helpful. The annual meeting of the Chamber of Commerce should do much to promote the work that Secretary Hoover is endeavoring to carry out.

Then, too, if the business men and the government departments can agree on a few fundamentals, and each is led to see the troubles of the other, there will be less antagonism over details.

# Annual Working Days of Farm Tractors

MANY of the farmers who purchase tractors do not at once dispose of the number of horses that the tractor should be able to displace. The tractor is something new to them, largely of the nature of an experiment, and they decide that they will feel their way slowly and not take any unnecessary risks. The loss of any considerable part of his crop is a serious matter to the average farmer, and as he is not quite sure of his tractor and of himself as a tractor operator he holds onto most of his horses for the first year at least. The result is that the tractor does not prove as economical as it otherwise would.

For some classes of work the tractor is so obviously superior to the horse that most or all of it is done with it right away. This applies particularly to plowing. After a farmer has once plowed at the rate of 8 acres or more a day, the old rate of 2 to 2½ acres seems exceedingly slow. But for other lines of work the tractor is not visibly better than the horse, and as long as horses are kept on the farm in any numbers they will be used for this work. To judge from a report recently issued by the U. S. Department of Agriculture, this applies particularly to haying, for whereas 85 per cent of all the plowing on the farms covered by the report was done by the tractors, only 15 per cent of the hay loading and hauling was so done. The low efficiency the tractor showed in hauling hay on wagons is readily understood, because in drawing a load of hay the tractor is giving only a small fraction of its maximum useful output. But in order to make the tractor an economical investment, all of the work for which horses are usually required should be done by motor power so that horses can be dispensed with.

It is rather remarkable that the investigation, which covered 286 farms in Ohio, Indiana and Illinois with an average area of 258 acres, showed an average annual use of only 30.8 full days per tractor. Some years ago it was figured that the average number of days use per year was close to 50, while at the Columbus tractor show one of the speakers mentioned 45 days. It would seem that on the farms in-

vestigated there was altogether too much equipment for the work to be done, which cut down the amount of work for the tractor, and hence its economy.

In making this statement we are not finding fault with the report, the natural object of which was to present conditions as they actually existed. The trouble is that, for one reason or another, the farmers found it impossible to dispense with a considerable number of horses and that owing to the existence of both the horse and the power equipment the annual working time of both was undoubtedly very low.

It is rather remarkable that only 2.7 full days of belt work was done annually by each tractor. It ought to be an easy matter to find much more belt work than this. The solution of the power farming problem lies in rendering the equipment adaptable for the multitudinous classes of work that require to be done on the farm, thus eliminating the cost of horse maintenance and reducing the periods of idleness of the expensive power equipment.

## Better Springs for Light Loads

ONE factor frequently commented upon in connection with passenger-carrying vehicles relates to the fact that they are almost universally hard riding under light loads. It is necessary, of course, to fit to any such vehicle springs having sufficient capacity to carry a full complement of passengers, even under adverse road conditions, with the result that when the same vehicle is only partly loaded the riding qualities are much less satisfactory. This is espepecially noticeable in the case of a bus when such vehicle carries only a few of the total number of passengers for which seats are provided, particularly when, as is usually the case, rather poor cushion springs are provided.

During the past few years many unconventional types of springs have been suggested which are designed to overcome this fault, but so far as we recall none of these have proved sufficiently satisfactory from every standpoint to see any extensive commercial application. So the problem is still with us.

Spring suspension is one feature of chassis design which has perhaps received more study than any other one item outside the engine and its accessories, yet there is still room for great improvement. The theory of spring action is well developed, but it still remains to design springs which are entirely satisfactory under all conditions of service. The problem is not an easy one, but the reward for its solution should be great enough to encourage those who are sufficiently persistent in work to this end.

## Highway Transportation

UNTIL the many industries that use the highways, either in the transportation over them of their raw material, partly manufactured or finished products, realize the relationship of their industry to the highway problem it is not to be expected that transportation development will go ahead as it should.

The highway problem to-day is more than one of road construction and maintenance, it is one of the proper use of the highway and streets of our cities; it involves not only the highway but our railway and waterway termini in relation to these highways and the most efficient methods of handling commodities over these highways.

Our highway problem is one that must be looked squarely in the face not only by motor car and motor truck manufacturers, but by railway executives, city governments, suburban trolley interests, waterway executives and every other executive with whom transportation is a problem. It is only by the broad consideration of it by all of these parties concerned that economic results will follow. The movement cannot be pushed by any one industry to the detriment of others. The broad policy of rendering to the railroads that which economically belongs to the railroads and to the highways that which economically belongs to highways, must be applied throughout to waterways, trolleys and, in time, to airways.

In the bringing together of these several interests, the Federal Highway Council has accomplished commendatory service. For the first time in the history of highway transportation large railway executives, large express company executives and large trolley and waterway executives have met with highway executives and traffic executives to work together in untangling the highway problem. Some disinterested organization of this character is the only kind in which all interests will agree to come together. It is to be hoped that the work already accomplished by these varying interests, meeting under the guidance of the Federal Highway Council, in connection with store door delivery will continue and that, when this needed movement is accomplished, the problem of the short haul will be as fearlessly considered by all parties concerned as has the store door delivery. No other organization, without strings tying it to some particular industry, is so well qualified to handle this work. There is every year a growing need for such a citizen organization. It is free from government domination. It is not obliged to answer any particular industry. It works with but one end in view, namely, the economics of highway transportation, construction and maintenance.

## Floatless Carbureters

SOME engineers are of the opinion that the next step in carbureter development will be the elimination of the float mechanism. Several carbureters of this type are being marketed in Europe, and a few are offered by American manufacturers. Some of these have means for vacuum feed and thus make it unnecessary to use a separate vacuum tank or pressure fuel feeding system. There is thus eliminated in some cases two float mechanisms, which, though they are the cause of relatively little trouble in themselves, add extra parts which advocates of the floatless vacuum feed type maintain are superfluous, and therefore involve a needless expense. A device of some kind must, of course, be substituted for the float, and whether this will involve moving parts that are less reliable and less expensive than the float mechanism remains to be seen.

# Unit Parts Makers in Service Plan

## Stations Proposed to Cover Country

### Complete Stocks for Assembled Cars to be Carried Within Easy Reach

DETROIT, March 22—Rapid progress has been made in the past few days by some of the leading unit parts manufacturers for the establishment of a nation-wide distribution system for parts for assembled cars and trucks. The plan is said to have the approval of some of the leading vehicle assemblers. Plans are rapidly being brought into workable form and a definite announcement is expected in the near future.

The entire subject was considered at a conference in New York last Friday, but many details remain to be worked out. Thirty major stations where standard unit parts can be obtained by distributers and dealers are in operation, but the plan calls for twice this number of major stations and as many substations as may be needed to cover the country in such a way that no service shop will be more than six hours distant from the nearest parts depot.

The idea took nebular form in the minds of various parts and car manufacturers at about the same time, and was in recognition of the need for better servicing of automotive vehicles. There were differences of opinion as to how it should be worked out, and it was necessary to reconcile these opinions. This resulted in many informal meetings and in much missionary work. One of the leading engine manufacturers was the prime mover, and he now has associated with him some of the most prominent unit parts makers.

Consideration was given to the subject at a recent meeting in Chicago of the Motor Truck Manufacturers Association, and there will be a conference here next week between committees representing the parts makers and the Motor Truck Sales Managers Association.

#### Will Carry $5,000,000 Stock

The depots will carry ultimately stocks of parts of eight unit manufacturers. It is estimated $5,000,000 will be invested when the system is in complete operation.

A nation-wide advertising campaign announcing the sale of genuine parts at prices which will eliminate the pirate is planned to stimulate demand for genuine parts and to acquaint the owner with the fact that they can be obtained at the same price or less from the depot maintained under the new system. The genuine replacement parts will bear the trade mark of the unit manufacturer.

There is a wide divergence of opinion among passenger car and truck manufacturers in regard to the merits of such a system. Some of them are in hearty accord with the movement and others are bitterly opposed to it.

Promotors of the venture contend that under this system it would be much less expensive to carry an adequate stock of parts and that it would give a tremendous stimulus to the sale of assembled vehicles. There is no idea of preventing manufacturers, distributers and dealers from carrying a stock of parts if they so desire.

#### Would Avoid Duplication

In behalf of the plan it is pointed out that under the present system many duplicate stocks are carried in each city, but in the case of smaller car and truck stations these stocks are often inadequate. Then, too, the lack of uniformity in profit percentages and charges, and varying distances between assembling factories and service stocks, results in wide divergence in prices on the same part in the same city. The aggregate stock carried in some of the cities is so large, yet so spread out, that it does not meet the real needs of many of the stations, and had proved so expensive that the overhead more than absorbs the profit, even when this profit seems to be unduly high.

The result is that pirate parts manufacturers and dealers can quite easily sell these parts for a mere fraction of the price asked by the dealer with the contract. Under the new plan, distribution would be unified so that a complete stock would be carried in one central

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## SOVIET GOVERNMENT BUYS SLOUGH TRUCKS

LONDON, March 21 (*Special Correspondence*) — The Russian Soviet Government is understood to have contracted with the Slough Trading Co. for the purchase of a large number of reconditioned trucks now stored at Slough. A very large proportion of these trucks are of American make and were sold by the War Department at the close of the war. It is reported that the Russian Government wants to buy several hundred, and since the trade agreement between Russia and Great Britain has been signed it is not expected any obstacles will be placed in the way of the transaction. The sale will help trade renewal and will stabilize the market value of several classes of motor trucks.

## Importers Organize in Mexican Capital

### Will Seek to Improve Methods of Car Importation, Distribution and Sale

NEW ORLEANS, March 21—Spanish newspapers of the city of Mexico received here to-day tell of the organization in the capital of the southern republic of the Mexican Association of Automobile Importers, embracing as active members all the firms engaged in this line in Mexico City, and as associate members about 78 per cent of the firms similarly engaged outside the capital. There are about a score of these firms in Mexico City, but the number in the other large cities of the country are not mentioned.

In its statement to the press, the "Associacion Mexicana de Importadores de Automoviles," to be known briefly as the "A. M. I. A.," gives the purposes of its organization as "to procure unity, harmony and better relations, both business and social, among the automobile importers of Mexico; to represent its members in all necessary action to obtain commercial advantages and legal protection; to improve methods of importation, distribution and sale of automobiles throughout Mexico, and to assist in the establishment of good roads in all parts of the republic."

Apparently the native newspapers of Mexico City are largely responsible for the organization of the association, as the first meeting was held in the offices of one of the papers, and was attended not only by all the automobile importers, but by the publishers of all the newspapers in Mexico City, and in several surrounding cities as well. Entrance fees of $250 (gold) for active members,

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## SEES CHEAP AIRPLANES SOON

BOSTON, March 18—Airplanes as cheap as automobiles were predicted by M. Luckiesh, director of applied science at the Nela Research Laboratory in Cleveland, who spoke at the Engineers' Club under the auspices of the American Institute of Electrical Engineers. He said this ought to come in five years.

## PREPARE TO BUILD FORD DAM

TROY, N. Y., March 21—Engineers having in charge preliminary arrangements for the erection of Henry Ford's great tractor plant at the United States dam across the Hudson River here have arrived in this city and will begin active work excavating for the power plant as soon as the high water recedes.

# Business Continues Upward Trend

## General Conditions Show Improvement

### National Response to Better Business Extends—Spring Weather Brings Cheer

NEW YORK, March 21—Reports from various sections of the country indicate a slow but gradual improvement in trade and industrial conditions in general. Excellent spring weather has broadened sales demand, both at wholesale and retail. The early spring has had much to do with the upward trend in automobile sales and it is partly seasonal.

Good weather has brought increased activity in farm work and plowing and planting are moving rapidly northward. This should improve the spirits of the farmers and make them a little more willing to buy. It probably is responsible for reports of better trade prospects in Kentucky, Minnesota, Missouri, Iowa and Texas. There are few districts, in fact, which report wholesale or retail trade as dull. In most sections it is classed as "fair."

It must be conceded, however, that while conditions are steadily improving, especially in the automotive trade, industry as a whole is lagging and that while unemployment is less widely diffused there are millions of workers who are idle. In this connection it is encouraging to note that unemployment is decreasing in the South and that several thousand men have gone back to work in Chattanooga, Louisville, New Orleans, Memphis, St. Louis and Atlanta.

It has been said that when the break in sales resistance came in the Northwest the worst would be over. The indications are that this condition soon is coming if it has not already arrived. Any sign of improvement in the South is significant for it has been felt it would take this section longest to go through the readjustment process. Although conditions there are getting better, it is too early to look for heavy sales. In this connection the Atlanta correspondent of AUTOMOTIVE INDUSTRIES says:

**All Lines Found Improved**

"Business is gradually getting back to normal in all lines but it has not yet recovered from the long period of depression. An intensive merchandising and sales campaign at this time doubtless would produce some results but postponement of that effort until conditions are more favorable, probably would be advisable. The condition of the cotton market always has much to do with the financial situation in the South. The present price still hovers around 10 cents a pound and with thousands of farmers holding last year's crop for higher prices they haven't the money with which to buy anything. Caution is advisable until it is known just how much the cotton acreage will be reduced this year. If there is a material cut it probably would be safe to make a hard drive for sales as higher priced cotton will be the inevitable result."

The central west seems to offer good sales opportunities at this time. The Milwaukee correspondent of AUTOMOTIVE INDUSTRIES wires:

**Central West Reviving**

"Knitting mills are running full time. Other factors in the clothing and dry goods business show rapid improvement. Further slight revival is noted in the steel industries. Merchants find money easier to get and a marked improvement is expected at once, with the income tax paying period past. Hotels report a revival of business, the first since December, and used car advertising brings a much improved response. Altogether the outlook is distinctly encouraging."

Taken as a whole there has been something of a general industrial revival in Ohio and Indiana and there has been a considerable increase in the sale of cars.

The outlook in New England is not so encouraging as it was a few weeks ago when renewal of operations by textile mills and boot and shoes factories was general. It was found that the orders which resulted in the opening of plants were largely to complete depleted stocks.

## R. A. Stranahan Predicts Car Shortage in June

ATLANTA, March 18—R. A. Stranahan, president of the Champion Spark Plug Co., and of the National Automotive Equipment Jobbers' Association, predicted that there would exist a shortage of motor cars in the United States by May and June of this year, in an address before the Southern Automotive Equipment Jobbers' Association, which held its annual convention in Atlanta, March 11 and 12.

Stranahan declared that Champion business during January and February of this year compared very favorably with the same months in 1920, while advance specifications from dealers and jobbers were better for March of this year than the same month in 1920, and for April of the present year were more than 100 per cent greater than April, 1920. Orders, however, he stated, were still low, not more than one-third or one-half as great as during the same period in 1920. In the sale of manufacturers' equipment, he declared that 1921 would fall considerably below the record of 1920, but expressed the belief that the accessory and equipment business as a whole for 1921 would surpass 1920.

## Kansas City Finds Sales Volume Rising

### City Buying in Good Volume—Farmers Returning to Market Slowly

KANSAS CITY, March 21—Steady increase in retail trade is reported in Kansas City and the larger cities of the territory. Established dealers with a good car of reputation, with service departments actually helping to keep cars running—this class of dealers is getting really first class volume. Cars not so well known and cars handled by dealers who for one reason or another have not maintained service, are not selling so well at retail; the shortage in movement reduces the average of passenger car sales to about 80 per cent of normal in the city.

After two weeks of brisk movement of carloads from Kansas City distributors to country dealers, this phase of the business has settled down to a steady outgo of single cars, usually driven out by or for the country dealer. The dealer in the small town is having difficulty financing his stock purchases; the farmer, his chief source of volume business, is not buying yet, and the small-town business men do not offer a wide market. Dealers are taking from distributors, therefore, only as they sell. But this volume is increasing steadily, as farmers become reconciled to new conditions.

The chief factor now operating to increase sales is the restoration of confidence in the minds of the salaried man. Until this month men on salary were hanging onto their money fearful of possible financial catastrophe (either personal or national). They now see that the world is moving calmly along; that business is being transacted in most lines on a level about 75 per cent of normal (in some lines 100 per cent) and that they are going to keep on earning and getting salaries.

Used car sales are said to be increasing faster than new car sales. Several dealers report that while they were getting fair results even in fall and winter and better this spring on new cars, they had not moved any used cars until the past few weeks.

**HANSON REDUCES PRICES**

ATLANTA, March 18—Prices on Hanson open models will be reduced at once. The 5-passenger and roadster models will be sold for $2,185, and the 4-passenger model at $2,285. The former prices were $2,365 and $2,465 respectively. The price on the sedan will continue at $3,165.

# Pence Company Buys Trainload of Buicks

## Half-Million Order Indicates Sales Resumption in Northwest—Ford Branch Starts

MINNEAPOLIS, March 18 — While generally speaking there is only a slight lifting of the sales cloud situation, one optimistic note is struck in the receipt by the Pence Automobile Co., which buys Buicks for a large territory and distributes on its own account, of a trainload of cars, the first time this train has moved its wheels for four months.

The Pence company owns two trains and this one was composed of 76 cars, four automobiles to a car, which cost the firm just $411,139.20. Upon arrival of the train the company had just thirty cars left in the house. It is the opinion of this firm that the savings banks' increased deposits show that the people have the money to buy automobiles. This firm's retail sales have looked up. However, generally speaking, the country situation does not seem much improved from a financial viewpoint, as to motor car purchases.

In the Twin Cities retail sales have improved some with the mild weather, but a large percentage of these are from car owners and involving trades. The new business does not seem to be appreciable. In trucks there promises to be a better business. In fact inquiry is good, but the basis of the hope for better business is the quantity of trucks that will be required by contractors who get their bids accepted for road construction under the Babcock law, adopted by popular vote at the general election in Minnesota.

Another note of interest is the resumption of operation by the Minneapolis assembling plant of the Ford Co. The rate of assembly reached this week is 250 cars per day. The branch reports 3500 orders of cars for March delivery in Minnesota, northern Wisconsin and eastern South Dakota. For April this is 6000 cars. These are larger than a year ago. Dealers' stocks are said to be about cleaned up.

# Buick and Dort Plants Increase Operations

DETROIT, March 18—Further improvement in the industry is shown in the step-up in production within the last three weeks in factories throughout Michigan. Practically every manufacturer outlined increased schedules for March production, but in many cases the brisk demand noticeable since the first of the month had resulted in revision of those schedules upward. This is true particularly in Flint, which was hard hit by the depression.

The Buick plant now is turning out around 250 cars daily, the output for the last ten days ranging from 240 to 260. The Buick plant capacity in finished cars is 600 daily. During last year's peak Buick was employing 22,000 men. There are approximately 12,000 employed now working about 60 per cent normal time. Sales demand, Buick officials say, is better than was expected, necessitating the sharp upward trend in production. The plant built approximately 200 cars a day in February.

Dort Motor Car Co., which produced about 700 cars in February, now is turning out an average of 60 each day with 500 of the normal force of 1500 men working full time. The new Dort model, officials say, rapidly is winning its way with automobile lovers, and actual sales and prospects they say will necessitate another step-up in production by the end of March.

# Dodge Resumes Work with 4000 Employees

DETROIT, March 21—About 4000 of the normal force of 22,000 employed at Dodge Brothers resumed work to-day on a schedule conforming with sales requirements which is expected to be steadily increased.

Arthur T. Waterfall, general manager, said that the company would make no statement regarding the actual number of men to be employed at the start nor the probable production. The report that the company would put on a night shift was denied by officials, who declared they were just feeling their way and that future activities would depend entirely on demand.

# Canaday Forms Company to Handle Willys Ads

TOLEDO, March 21—The formation of the United States Advertising Corp. by Ward M. Canaday, formerly advertising manager of the Willys-Overland Co., was announced this week. The move indicated a further trend toward economy in the Overland administration.

Practically the entire management of the Willys advertising staff goes over into the new company, which will handle the Overland contract and the Mather Spring Co. advertising. Canaday is president of the company. He has been with the Willys-Overland company for five years. The company is capitalized at $50,000. It will have charge of Overland service publications as well as all advertising. The Overland contract was held for many years by the Martin V. Kelley Co.

### DECLINE NINE HOUR WORK DAY

YOUNGSTOWN, OHIO, March 19—Operations at the Salem plant of the Mullins Body Corp. have been suspended following the refusal of employees to work nine hours a day at the same pay they received for eight hours. The men asked for a reduction of 10 per cent and that the eight hour schedule be continued. The 10 per cent reduction has been made in the wages of executives, office workers, foremen, engineers, watchmen and other employees as well as piece and premium workers.

# Overland Factories Extending Schedules

## Plan Centralization of Production Control and Development of Quality Standards

TOLEDO, March 21—With the return of Overland officials from the Boston automobile show yesterday, indications appeared to point to gradual increase in production at the Toledo plant of the Willys-Overland Co. Vice-President Charles B. Wilson and Sales Manager A. C. Barber attended the show at Boston and met with the Willys New England dealers while there.

It was the first opportunity the dealers have had to get acquainted with the new factory heads and also put the factory men in touch with the Eastern markets. The officials expressed themselves as pleased with the results of the show.

On Thursday the first issue of the Willys News, the factory employees' paper, since the change in management and since the "closed for inventory" period last November, was put out.

Employees are being added to the payroll and the production of Willys-Knight cars is increasing. The plant schedule is now running between 25 and 40 cars daily. The output varies with the demands from dealers.

Much of the work at the plant for several weeks has been directed toward increasing the quality of Overland products. All parts on hand have been rigidly inspected and the officials have ordered more attention to all details in the production end.

A new production system is being installed at the plant under the supervision of Wilson. The general plan has the goal of centralization of production control and development of quality in the product. J. A. Sheldon, production manager, will have direct factory supervision of the production plan, and Ernest Smith, will have direction of the executive work.

A central planning office is being organized and co-ordinated with it will be production booths in each department of the factory. The amount of work to be done daily will be laid out at the central office and the part each department will do will be indicated at its own production booth. Each booth manager will know the amount of work to be done in his section and the time of its arrival and departure.

### To Decide Changes in Models

An important part of the general program being lined up is the naming of a committee to pass on proposed changes and improvements in the Overland models. There are eleven men on the committee, including some of the oldest employees of the company.

"These men will be expected to keep our cars in the vanguard," said Vice-President Wilson. "Any suggestion that any man in the factory makes will be considered by this committee."

# Chevrolet Refund Offered to Buyers

## Will Return $70 to $100 a Car if Sales Aggregate 50,000 Vehicles by July 31

NEW YORK, March 21—As a special inducement to prospective buyers to come into the market at once, the Chevrolet Motor Co. has announced a refund of from $70 to $100 on its several models, providing sales between Jan. 1 and July 31 equal the 50,000 production schedule which the company has outlined for this period.

List prices of models and the amount of reduction under the proposed plan are:

Roadster and touring, $795, refund $70; light delivery wagon, $820, refund $70; chassis, $770, refund $70; coupe, $1325, refund $100; sedan, $1375, refund $100.

According to the announcement the refund represents savings in material prices under present readjusted conditions, which savings can be made provided Chevrolet factories continue to operate on the estimated average quantity production basis. It is in keeping with the Chevrolet policy, it declares, to make the price of its product as low as quality manufacture on a large scale will permit.

Fifty thousand cars is the minimum, the company says, which its engineers estimate will secure substantial savings in cost in manufacture. Purchasers under the plan will receive a certificate from dealers which will be redeemed as indicated on its face. Production results will be announced by August 10.

# Goodyear Coordinates Sales Departments

AKRON, March 21—With the appointment of R. S. Wilson, truck tire manager, as manager of the Western division of the Goodyear Tire & Rubber Co., with headquarters in Chicago, several changes in personnel have been announced coincidentally with a readjustment of the Goodyear sales service, so as to improve the company's method of stimulating sales service throughout the entire country.

Wilson, as Western division manager, will supervise a territory embracing twelve States. He succeeds H. P. Ziegler. G. E. Brunner, manager of the service department, has been announced as successor to Wilson as truck tire manager at Akron.

Brunner's promotion leads to a change in the functioning of the service and of the sales promotion departments, under which C. W. Santee, who has been manager of the sales promotion department, becomes manager of sales service.

Responsible to Santee will be R. W. Clark, manager of sales promotion; W. H. Sorn, manager of the service department; P. R. Baugh. manager of the dealer development division; H. H. Tolman, manager of the government sales division; C. A. Reed, manager of the stock clearance division, and A. R. Kroh, farm lecturer and field worker.

The new arrangement which closely co-ordinates the work of various departments directly related to sales, is expected to increase the scope of Goodyear sales service. Santee, now director of the plant has been with Goodyear since 1919. He was first attached to the office of sales manager L. C. Rockhill, later becoming manager of the sales promotion department in charge of the work of centralizing promotional work on all products.

Brunner, the new manager of the truck tire department, has been with Goodyear since 1914. He is a former faculty member of Mercersburg Academy. He became manager of the service department in 1917.

### Goodyear Meeting Adjourned

AKRON, March 21—The special meeting of the stockholders of the Goodyear Tire & Rubber Co., set for to-morrow, to act upon the reorganization program, has been adjourned to March 29. This is the second postponement, but President Seiberling declares satisfactory progress is being made by the committees negotiating with merchandise creditors, although a little more time will be needed to adjust the situation satisfactorily.

# Ford Plant Increases Production of Benzol

DETROIT, March 18—The first of a number of benzol stations to be operated by the Ford Motor Co. has been started here. Heretofore the sale of benzol has been confined to three Ford stations near the Rouge and Dearborn plants, outside of Detroit. With production increasing at the blast furnaces, the company plans to maintain stations throughout Detroit.

The fuel is a by-product extracted from the gas produced when coal is decomposed into coke at the Rouge ovens. The 5000 gal. produced daily is mixed with an equal amount of gasoline to make impossible the thickening of the by-product in cold weather, and a 12 per cent mileage increase is guaranteed. The fact that the benzol is sold cheaper than gasoline naturally is an inducement to drivers.

### KENWORTHY REORGANIZED

SOUTH BEND, IND., March 21—The Kenworthy Motors Co has been reorganized and the majority of the board of directors now consists of officers of the Dodge Mfg. Co. The new directors are F. T. Howlett, general purchasing agent; Walter E. Rowe, chief engineer; Frederick S. Willett, comptroller, and Temple Williams, assistant to M. W. Mix, president of the Dodge company. The Kenworthy plant is being operated under the direction of Rowe. The books are being brought up to date as rapidly as possible and an investigation is being made to determine the possibility of continuing operations.

# C. C. Hanch Joins Advertising Firm

## Former Maxwell-Chalmers Executive Will Be Counsel to McKee Company

INDIANAPOLIS, March 21—Charles C. Hanch, vice-president of the National Automobile Chamber of Commerce, widely known in the administrative activities of the automobile industry, has become associated with the Homer McKee Advertising Co., Inc., of Indianapolis. Hanch has long been associated with the automobile industry,—nineteen years as treasurer of Nordyke & Marmon Co. of Indianapolis, four years as treasurer of the Studebaker Corp. and later as general manager of the Maxwell-Chalmers interests.

In entering the advertising and merchandising business with the McKee organization Hanch will be able to continue his close contact with the automotive industry, through his work as general business counsel of the McKee company. Hanch believes conditions have brought about a new alignment in American business in which scientific distribution of goods based upon sound engineering, production and finance is the crying need in the transformation through which the automobile industry is passing. He points out that manufacturers have reached the peak on production economies and now must concentrate upon distribution economies which heretofore have been permitted to run wild.

Hanch is chairman of the Taxation and Patents committees of the National Automobile Chamber of Commerce and was one of the prime movers in the organization of the national body of automobile manufacturers. He had been in Washington lately in conference with the government's taxation experts relative to tax revision in impending legislation. During the war he was Chief of the Automotive Products Section of the War Industries Board at Washington and following the armistice he was sent abroad by the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce to study and report commercial and industrial conditions in England, Belgium, France and Italy.

One of Hanch's accomplishments in the automobile industry was the initiating of the movement and serving as chairman of the committee that effected the cross-licensing patent agreement among American automobile manufacturers.

### PERFECTION PAYS CREDITORS

MILWAUKEE, March 21—Creditors of the Perfection Engine Co. have accepted the offer of a 50 per cent composition of all claims, which are being liquidated by special loans made by two principal stockholders in the corporation. It probably will continue operations. Upon involuntary bankruptcy proceedings, schedules were filed admitting liabilities of $16,306.76 and claiming assets of $27,273.56.

# Continental Nears 70 Per Cent Basis

### Will Reach New Production Mark by April 1—Truck Demand Remains Slow

DETROIT, March 21—Steady improvement in the passenger car end of the automotive industry is demonstrated in the constantly increasing production at the Detroit plant of the Continental Motors Corp. Officials said to-day the plant would be on a 70 per cent production basis April 1.

While there has been no marked increase in production of truck engines at the Muskegon plant, that end, they say, is showing signs of improvement. With the start of roadway repair and construction, and building operations throughout the country during the next few weeks, the demand for trucks is expected to take a spurt. Continental officials, however, do not look for greatly increased production in the truck end for 60 days.

Renewed activity in the passenger car division is not confined to any car or group of cars, but reflects conditions throughout the industry, officials say. It is significant that with the increased production Continental at present is employing only about 45 per cent of the normal force. The normal mark, insofar as production is concerned, officials say, will be maintained with less than 75 per cent of the usual force.

## Toledo Commutator on Full Production

TOLEDO, March 21—The Toledo Standard Commutator Co. has gone on a full time production basis this week. The company has several contracts with automobile factories and has begun receiving orders for the production drive getting under way.

At the annual meeting of stockholders this week the officers were re-elected. Charles A. VanDeusen is president; Eugene Rheinfrank, vice-president; E. B. Moon, secretary-treasurer. D. O. Kershaw, for many years with the Electric Auto-Lite Corp., has associated himself with the company as vice-president and general manager.

### W. S. HUDSON TO BUILD TRUCKS

PHILADELPHIA, March 21—William S. Hudson, president of the Hudson Motor Specialties Co. and inventor of the Hudford truck attachment, is forming a company to build a 3-ton truck which will embody in its construction many of Hudson's patented features. The vehicle will be named the Hudson truck and it will be produced by the Hudson Motor Specialties Co. The control will be in the hands of Hudson who is said to have evolved entirely new methods of distribution. J. H. Malone, who was advertising director of the Chilton publications, will be vice-president.

### SOUTHEAST EXPRESS MOTORIZES DELIVERY

ATLANTA, March 21—The Southeastern Express Co., organized some weeks ago to take over the business of the Southern Railway lines, has standardized on White trucks and placed a large order for equipment. When delivery is completed the fleet operating for the Southeastern Express Co. will be one of the largest truck fleets in the South. The order was placed through the White Atlanta branch by J. R. Hockaday, president of the new express company.

## Baxter New President of Holt Manufacturing

STOCKTON, CAL., March 19—Thomas F. Baxter has been elected president of the Holt Mfg. Co. to succeed the late Benjamin Holt. Baxter has served as general manager since 1914. Alfred B. Holt, elder son of the founder of the company, has been elected a vice-president, and C. Parker Holt is treasurer. William E. Shepherd has been made manager of the Western end of the business, and J. A. Hymer, sales manager of the Western territory, succeeding Thomas H. Luke who becomes director of sales. R. S. Springer remains as vice-president and factory manager, and M. M. Baker as vice-president and manager of the Peoria plant.

The company reports that there is a satisfactory sale West of the Rocky Mountains of the 5-ton model of the caterpillar tractor, which was offered in that territory for the first time only a few months ago. This model, which was used by the American army during the war, is offered in standard type for general farm and road work, and a special low seat design has been made for orchard work.

## Velie Speeds Output to Thirty Cars Daily

MOLINE, ILL., March 21—Production of the Velie Motors Corp. has jumped to 30 cars a day and next week is expected to go to 35 daily. The plant has gone on a 9-hour shift to meet the production schedule and this working hours increase, officers say, has been effected without decrease of wages.

Lee Hazard, production manager, says Velie orders within the last few weeks required the increased production and he does not foresee any early let up.

### HAYNES PASSES 60 PER CENT

KOKOMO, IND., March 21—The Haynes Automobile Co. is gradually returning to normal production schedules. With the addition of a considerable number of employees the factory is now turning out cars at more than 60 per cent of its capacity. It is expected this figure will be raised to 75 per cent in April.

# Winton Production Normal by May 1

### Changes in Executives Witness Return of Alexander Winton to Active Role

CLEVELAND, March 21—An increase in sales of cars that set in on Jan. 1 and has continued to the present, led to the statement to-day at the plant of the Winton company that the factory probably would be operated on maximum production capacity by the first of May. The capacity is ten cars a day.

At the same time, the announcement was made that C. W. Churchill, who for a number of years had been general manager of the corporation, has resigned. Churchill retains a monetary interest in the corporation. Several years ago he came to the local plant from the New York branch of the corporation to act as sales manager. Later he was made general manager.

The position vacated by Churchill has not been filled and for the present his duties will be discharged by executive officers of the corporation. In the last few weeks, Alexander Winton, whose business capacity and knowledge of the automobile industry were responsible largely for the upbuilding of the corporation, has been taking a more and more active part in directing affairs.

Another change of executives was made in the sales department where J. C. Miller was made manager of sales, succeeding O. F. Baughman, who had occupied the position for a number of years. Miller left the New York branch to take up his new position.

Charles Mears, advertising manager, resigned, effective April 1, to engage in the advertising business in this city. He will handle the account of the Winton company in connection with his business.

### INDUSTRY'S PAY-ROLLS GROW

WASHINGTON, March 18—Study of employment in selected industries during February as conducted by the Bureau of Labor Statistics of the Department of Labor shows the per capita earnings in the automobile trade were 16.2 per cent greater than in January. This increase is found despite cuts of 15 per cent in one establishment and five per cent in another. There was an increase of 1.3 per cent in the number on the payrolls of 40 reporting automobile plants. and an increase of 17.8 per cent in the amount of the payroll.

### GRAND PRIX DATE, JULY 25

PARIS, March 1—(*Special Correspondence*)—Monday, July 25, has been definitely fixed as the date of the French Grand Prix 3-liter race at Le Mans. The Motorcycle Grand Prix will be held on the previous day over the same course. This change has been made in order to attract the popular crowd, which only has Sundays free, to the race for two-wheel machines.

# Amarillo Becomes Big Tractor Center

## Farm Machinery Sales in 1920 Total $20,000,000—Transform Former Cattle Ranches

AMARILLO, TEX., March 21—Amarillo bids fair to be the chief distributing point for tractors, power farm machinery and road building machinery of the entire Southwest in the next few years. This is indicated by the number of big distributing concerns located here now and the amount of business done during the past year. The motorized farm machinery business grew from an insignificant figure in 1915 to $20,000,000 in 1920.

This is considered phenomenal by the machinery houses of Texas and the big cities of the North and East when it is taken into consideration that the farm implement business in the Panhandle of Texas and New Mexico is really in its infancy. It is considered more remarkable because Amarillo is the only city of 16,000 in the United States which did that amount of farm machinery business during the last year.

Machinery men believe Amarillo will become the greatest distributing point in the country because the vast stretches of rolling prairies, once great cattle ranches, are rapidly being made into grain farms of vast acreages. The tractor and the other motor implements of the farm are being installed on every ranch which is subdivided into farms. A ranch which formerly contained 50,000 acres—and there are hundreds of them—means from 50 to 100 tractors, a score of binders and a bunch of threshers.

In a few years the vast plains of west Texas will be waving fields of grain and other crops, and as this is developed the sales of motor farm machinery will be increased, the machinery men say. In addition to the hundreds of thousands of acres of land being converted into farms in the Panhandle of Texas, like numbers of acres are turning to growing crops in New Mexico and parts of Oklahoma which are supplied by the implement houses in this city.

### Nine Houses Now Open

At present there are nine big implement houses located here. They employ several hundred persons and have an annual payroll of several hundred thousand dollars. These nine houses did $20,000,000 worth of business in implements last year, and they report that despite the fact that money appears more stringent, the business for 1921 will increase from $5,000,000 to $10,000,000.

The big concerns located in Amarillo now are: Case with C. E. Kiser as manager, Avery with H. M. Hunter as manager, the Emerson-Brantingham with G. W. Davidson as manager, Dempster with R. T. Emmett as manager, Harvester with W. A. Frisk as manager, Roberts-Troxell with George Roberts as manager, Twin City with R. B. George as manager (Mr. George also handles the Oliver lines), Advance-Rumely with J. G. Wells as manager, Allis-Chalmers with J. D. Ingram as manager, and Kibbe Tractor & Implement with P. F. Kibbe as manager. The Minneapolis Threshing Machine Co. also has a branch here with G. C. Small as manager.

In many cases district managers of the really big concerns are handling lines of farm implements not carried by their own concerns. In that way anything from a plow point to one of the biggest tractors or most modern binders or threshing machines can be had in Amarillo without waiting for orders from the main houses. Every branch house here carries a stock of from $50,000 to $100,000 worth of machinery and implements all the year around. Some of them handle auto trucks, and the farmers are buying them rapidly.

# Higher Taxes Hamper Car Sales in Japan

SEATTLE, WASH., March 21—Imposition of increased taxes is hampering the development of Japan as an automobile market, according to representatives of the American automotive industry returning from the Orient. Illustrative of the manner in which burdens are being heaped on motorists in the Nipponese Empire is a recent decision of the Yokohama Municipal Office to raise the schedule of motor car taxes about 30 per cent over the taxes formerly in effect.

Cars operated privately will be taxed from 85 yen (yen 50 cents United States money) a year upward, depending upon the seating capacity. The minimum of 85 yen a year is for cars with a capacity of three persons or less. For four passenger cars the tax will be 105 yen and 20 yen is added for each additional seat. A seven-passenger car, for example, will be taxed 165 yen a year.

Passenger motor cars in public service will be taxed at the rate of 65 yen for three-passenger capacity; 75 yen for four-passenger capacity, and 90 yen for five-passenger capacity, and 15 yen for each additional seat above five. Trucks of one, one and one-half and two tons are provided for, the taxes respectively being 50 yen, 55 yen and 65 yen.

### MILES ON EUROPEAN TRIP

NEW YORK, March 23—S. A. Miles, manager of the New York and Chicago Shows for the National Automobile Chamber of Commerce, sailed for Europe on the Aquitania, Tuesday. While abroad Miles will investigate the European automobile situation for the Export Department of the N. A. C. C. He will be abroad about two months. Besides Mrs. Miles, the veteran show manager will be accompanied by William G. Stirm and Charles E. Ellias. They have been associated with him for years in arranging shows and will be his guests on the trip.

# Banker Finds Cars Safer Than Stocks

## President of Gotham Bank Finds Losses Rare—Declares Stock Most Liquid

NEW YORK, March 18—Henry Bizallion, president of the Gotham National Bank, told Reo dealers of the New York territory in convention here to-day, that they could use two arguments to convince their bankers that their businesses were entitled to loans:

**1—There is no other class of merchants whose stock is so liquid.**

**2—Cases of loss by bankers who have financed dealers in stocking cars are so rare as to attract wide attention.**

The banker said that his wide experience in handling automobile paper had shown that the average dealer's loan on any particular car was usually liquidated in two months in this territory. He said a bank could more safely loan on cars as security up to 90 per cent of their value than on stocks.

Bizallion said that his bank advanced money to dealers on mortgages or bills of sale covering cars at the legal rate of 6 per cent plus a charge for drawing up the necessary documents, which never exceeded $2.

The banker said that in the long experience of his institution with automobile financing it had never lost a dollar except in one case of fraud, which he said might happen in any business.

A. M. Welch, assistant manager of the Reo Motor Car Co. of New York, presided at the convention luncheon. R. C. Rueschaw, general sales manager of the Reo company, talked along sales lines and congratulated the dealers on their part of the work, which he said had enabled the factory to operate at full tilt without warehousing cars or trucks.

### ARMY FIXES SALES DATES

WASHINGTON, March 19—Sales of surplus army automotive material will be held at Camp Jessup, Atlanta, the week beginning April 4; at Camp Normoylen, San Antonio, Texas, April 11; at El Paso, Texas, April 18; at Jeffersonville, Ind., April 25, and at Schenectady, N. Y., May 1. These dates are tentative and subject to revision.

The sales will be similar to the one held at Camp Holabird, Baltimore, at which a large number of unserviceable vehicles, as well as parts were sold.

### TO SELL OBERBERGER STOCK

MILWAUKEE, March 19—Foreclosure sale of 1260 shares of the capital stock of the John Obenberger Forge Co. owned by President John Obenberger and held by the First Wisconsin National Bank as collateral security for loans, will be held March 21 at the courthouse in Milwaukee at the instance of the bank. The financial affairs of the Obenberger company for some time have been in the hands of a committee of creditors.

# South Africa Finds Business Improved

## Tractor Representatives Make Bid for Market—Passenger Cars Find Buyers

JOHANNESBURG, SOUTH AFRICA, Feb. 4—(Special Correspondence)—The trade position in January has been quite satisfactory taking into consideration the general tendency to slackness in trade generally. The firms interested in the motor trade are reporting a general improvement; although this is only slight, it shows that the industry in South Africa is on a solid footing.

Tractors are being pushed out here and the Holt people recently held a demonstration near Johannesburg. The Titan agents have also been in the field in this direction. General Motors Export Co. are out to place the Samson tractor on the market and an expert is due to leave the States this month. He will be attached to the Johannesburg office, from which all distribution is made. Karrier and Guy Motors South Africa, Limited, have commenced operations in Johannesburg.

These English trucks have come to stay and it is noticeable that more trucks are being placed in commission in the commercial centers of the Union every month. Steam trucks are finding favor, but the internal combustion engine continues to do very well. Commercial houses are finding that the truck speeds up work and in consequence are buying them. There are now several firms in Johannesburg who have fleets of trucks for work of all descriptions and it is a matter of some difficulty to get fixed up in a hurry by them.

Consignments of Briscoe cars that were received a few weeks ago are reported to be all sold and other makes give similar results. The English Belsize has arrived. The four gear system is installed and because of this hill climbing is not as easy without changing, as is the case with most American cars.

### Light Cars Meet Favor

Among the light cars that are new arrivals are the Spacke and the Morris Oxford. The former needs no comment, as it is manufactured in the United States. This little car has been at Cape Town for some time, but the first model to come to Johannesburg only arrived a few weeks ago. The Morris Oxford is a light English proposition and is a car in every sense of the word. It is well finished and fitted with all the modern conveniences that are expected in a modern automobile. It is one of the few English cars that have come out here that is fitted with the three gear system. The latest model is very fine and has caused much comment all round. The Arrol-Johnston model (1921) has arrived and is fitted with disk wheels as standard equipment.

There has been no shortage of fuel during the past month and there is every indication at present that the supply will be maintained. South Africa is in a peculiar position. It is an important and fast developing country and requires all the assistance possible from the products of modern manufacture. The supply of petrol is a vital factor in a young country, as will be seen from the following. The railroad system of this country is very comprehensive, but it has to serve large tracts of fruitful land. At present there are no adequate feeders to the railroad system and in time regular truck services will be organized to feed the railways.

### Plenty of Work for Trucks

This is a recognized fact and the internal combustion engined truck is going to come in for a great deal of the work of developing the country. The fuel supply will, therefore, have to be clearly adequate before any such schemes can possibly be undertaken. At the present there is no guarantee that supplies will be adequate to fill the demand that will be made as the country develops. Special efforts are being made by both American and English manufacturers to place large quantities of trucks and tractors on the market in addition to passenger cars, and for this to be successfully accomplished there are two factors to be reckoned with. Fuel and service are essential in a country where long distances have to be covered and when these two problems are solved there is no reason why a large market should not be opened up.

Tires have seldom got a square deal in South Africa, owing to both lack of knowledge and bad roads, but the tire companies have opened campaigns bringing to the notice of the user the necessity of looking after their tires. Cords are becoming more popular, especially among motorists who do a good deal of country traveling.

### SOUTH AFRICA BUYS TOOLS

WASHINGTON, March 18—Trade in garage tools and equipment is growing rapidly in South Africa. Johannesburg alone now has over 150 motor-repairing and overhauling establishments, the whole of South Africa has over 1000, all of which, besides carrying stocks of spares and accessories, are constant purchasers of the tools peculiar to their business, according to a report received by the Bureau of Foreign and Domestic Commerce. Especially is there a demand for tire-levers, wrenches, bearing scrapers, sheet rubber, spanners, ordinary and snub-nosed pliers and similar appliances.

### INDIA INCREASES DUTIES

WASHINGTON, March 21—Duties on automobiles imported into India were increased from 7½ per cent ad valorem to 20 per cent as of March 1, according to a cablegram received by the Bureau of Foreign and Domestic Commerce from Consul General A. W. Weddell of Calcutta.

# High Fuel Prices Hurt French Trade

## Industry Threatened by Continued High Costs — Seek Abolition of Taxes

(By Cable to AUTOMOTIVE INDUSTRIES)

PARIS, March 21—Vigorous efforts to bring down the cost of gasoline will be made in France because of the realization that the life of the automotive industries is threatened by the present high price. Gasoline now is selling in France at 2 francs 45 centimes per litre compared with 92 centimes per litre in America at the present exchange rate. A syndicate of French manufacturers and representatives of various societies made up of persons using gasoline have united for concerted action. An attempt will be made to bring about abolition of Government taxes on gasoline and close study is being given to a proposal for the purchase by automobile manufacturers of large quantities of gasoline in Galicia to be thrown on the French market.

French dealers are preparing a petition to be presented to the Government for the abolition of the 10 per cent retail sales tax on all cars of not more than 15 horsepower. It is asserted that this tax is highly detrimental.

There was an increase of 854 per cent in French automobile exports for the year 1920 as compared with 1919. The value of the export business was 1,188,000,000 francs. Imports decreased 45 per cent.

Jules Goux has entered a Peugeot in the Indianapolis sweepstakes, nominating Howard Wilcox as the driver. Jean Chassagne is expected to enter a second Peugeot.

Germany announces that its first postwar automobile show will be in the fall.

Because of French competition, all the British aviation companies operating lines between London and Paris suspended their service but have resumed upon the promise of the British government to increase subsidies. The rates charged by the French companies for passenger service between Paris and London are practically the same as railroad rates.

The Belgian Minister of Finance has introduced a bill calling for a 20 per cent ad valorem import duty on cars.

### SPAIN TO REDUCE TARIFFS

WASHINGTON, March 21—The import duties on automobiles and possibly tires into Spain probably will be lowered by Royal Decree on March 20 or shortly thereafter. This information was contained in a cablegram from Commercial Attache Cunningham at Madrid to the Bureau of Foreign and Domestic Commerce. Cunningham advises that shipments for delivery after that date should be made subject to the new duty which is expected to be higher on such items as steel products, hardware supplies, textiles and others but lower on automobiles.

# British Sales Show 1921 Light Car Year

## Buying Tendency Ascribed to Excessive Large Car Costs—Factories Hard Hit

LONDON, March 10—(*Special Correspondence*)—Early indications that 1921 would be pre-eminently a light car year are being strengthened by developments. Application of the term is being widened and it seems to include everything up to 15 horsepower rating. Ultimately, however, the deciding factor in determining what is a light car will be either weight alone or weight and power rating up to some limit suggesting a correct ratio of power and weight.

Elastic use of the term "light car" is not without its dangers. One of them is that recently makers of genuine light cars have been fitting four seater bodies on short chassis, thereby reducing comfort and piling on weight. In one or two instances this has upset the balance of the car.

The main reason for this trend toward light cars is the present excessive price of the larger vehicles. The British light car now is priced at from $2,500 to $3,000 (normal exchange) which was the cost before the war of a medium grade full size British car. It should not be forgotten, however, that the buyers of $3,000 cars cannot afford it as well now as they could a larger car at the same figure before the war.

The big problem, therefore, is in determining how far it will be possible to cut the cost of a medium grade car and thereby eliminate the light car which is almost as expensive to build. This situation is working in favor of the "full bodied" American car.

As a means of reducing prices, there is a possibility of starters being eliminated from the standard light car equipment and of the magneto being superseded by a dynamo combined with an igniter.

### Leyland Business Shaken

The Leyland company, the largest British motor truck builder, proposes to bring out a light car in the near future to take the place of the straight line "luxury 8" shown at Olympia. This announcement indicates that the company senses the trend of demand. The balance sheet of the Leyland company shows a sharp falling off in business. This reduction makes it impossible to pay a dividend on the ordinary stock although the dividends will be continued on the preference shares.

### Crossley Report Disappoints

The report of Crossley Motors, Ltd., following close on the comparatively good showing of the first year's Willys-Overland-Crossley business, is disappointing as the figures include the substantial sum paid the Crossley stockholders by the Willys-Overland British interests for the Crossley aircraft factory at Heaton Chapel, Manchester.

Unless the company has a large inventory on hand it is difficult to see how it can hope to meet the expected revival in trade as it has a surplus of only $50,345. Apparently importing and assembling Overland cars, in spite of the 33 per cent tariff and the adverse exchange situation, is more profitable than the manufacture of expensive cars of the Crossley type. There recently have been reports that the Crossley company intended to bring out a "40" for the Indian and Colonial markets.

### To Wind Up Sanderson

The Joseph Sankey Co., manufacturers of metal wheels used on the Angus Sanderson cars, has taken judgment against Angus Sanderson & Co. for $75,000 and has obtained an order in the high court for the compulsory winding up of the company. This follows a recent decision of the bank creditors to continue operations. The financial difficulties of the company are considered unfortunate because the car is good value and has passed successfully through the development stages. The design is good and with certain modifications should lend itself to mass production, which was the original intention of the promoters.

### Trading Company in Difficulty

Following financial difficulties in the affairs of the makers of Bean cars, similar trouble is being experienced by the British Motor Trading Corp., the selling organization for these cars and for Glasgow agricultural tractors. The corporation has also very widely handled Crossley cars and Vulcan trucks. As a first result of these troubles, it is stated that the makers of the Glasgow tractors have taken over the selling organization.

### Sizaire Berwick Hit by Strike

The business of the Sizaire Berwick Co. now is being carried on by an administrator appointed by the creditors but it is understood the prospects are favorable and that the present output of 6 cars a week may be increased soon to 18 a week. The company suffered a long delay in getting into production because of the molders' strike which lasted 15 weeks. The present price of the chassis is $7,500.

### Price Guarantees in Effect

There is a widespread movement among British manufacturers to fall in with the arrangement first planned a short while ago by a few small makers to guarantee to refund to purchasers of their cars any payment made in excess of the lowest current price between now and a specified date in the future. This date is usually about July 1 next, though in one or two cases it is extended to August or until the end of the year. The following are among the prominent makers who have adopted this principle publicly: Albert, June 30; Crossley, July 1; Cubitt, July 1; Riley, July 31; Rover, June 30; Ruston Hornsby, June 30; Singer, June 1; Star, July 31; Sunbeam, June 30; Swift, June 1; Vauxhall, August 1. In addition a similar guarantee is issued by the British agents for certain American cars.

# Tractor Subsidies Proposed by French

## Army Experts Suggest Way to Advance Agriculture and Protect Military Needs

PARIS March 11—(*Special correspondence*)—French agriculture can be put into a flourishing condition, and the military interests of France can be safeguarded, if the agricultural tractor is made suitable for military operations as well as for work on land, declares General Castelnau. Before the war France had 16,000,000 acres of land under wheat cultivation, compared with 9,800,000 at the present time. To get the best results out of the land, French farmers ought to put 2500 tractors in service each year until a total of 25,000 is reached.

General Castelnau believes that the best way to accomplish this is by giving subsidies to farmers who own tractors which can be used, if necessary, for military purposes, and which the army could call up for service in case of war. The arrangement proposed is similar to that existing for trucks before the war, when France had an approved type of commercial truck suitable for military service. The army requisitioned 5000 of these trucks in 1914, and by the end of the war had increased the number of military trucks to between 80,000 and 100,000.

It is suggested that the same arrangement should be made for tractors, farmers being encouraged to purchase these semi-military types, which would be examined at intervals, in order to see that they were maintained in good mechanical condition and for which the Government would pay an annual subsidy.

### TO OPERATE TRUCK LINES

WASHINGTON, March 22—A concession has been granted to an Argentine company for the operation of three lines of motor trucks for passengers and cargo, the lines to run from Paraguari to Ita via intervening points, according to the Bureau of Foreign and Domestic Commerce. Considerable interest is aroused among agriculturists and Government officials in this proposed line.

### DENLINGER PARTS RESTRAINED

MERIDEN, CONN., March 21—The Connecticut Telephone & Electric Co. has been granted a permanent injunction restraining the Denlinger Lamp & Ignition Co. of Rochester from the sale of ignition parts alleged to have been made in imitation of the Connecticut patents.

### OLD TIMER DIRECTORS CALLED

DETROIT, March 21—Albert Champion, president of the Old Timers Club, has issued a call to the directors of the organization who were elected at the meeting in Chicago during the automobile show, to meet at the Hotel Durant, Flint, Michigan, April 2 and 3.

# Chamber Proposes Changes in Overhead

## Would Eliminate Rigidity of Present Systems and Allow for Better Distribution

WASHINGTON, March 21—Manufacturers throughout the country have been advised by the Chamber of Commerce of the United States that to adjust overhead charges on the basis of the normal year is to take a forward step to better times. Inquiry shows the plan to be feasible in practice, though there are many business men who regard it as novel and daring, an idea which must be demonstrated more fully. Many cost accountants insist that our cost systems are far too rigid because overhead expenses are spread too thin in times of forced production and massed too heavily in period of slight demand and production.

The fabricated production department of the National Chamber contends that cost systems should recognize the continuity of time wherein any single year or month may or may not typify and represent normal production and demand. It is pointed out that certain expenses accrue regardless of operation of plants and often bear no relation to output. Cost systems should provide that these expenses, known as overhead, should be absorbed and pro-rated on the basis of a normal year.

This practice would allow absorption of overhead in costs, and create a surplus of overhead cost to take care of those years when output is reduced below normal and overhead charges are not fully taken up in the costs of the year. The chamber tells us that this method would assure the business man a reward for his efforts in speeding-up; eliminate the needless throttling of business by the practical attempt to load semi-normal production with greater charges than can be borne or should be borne.

### What Is the Normal Year?

The question naturally arises, "What is the normal year?" The standard year is indeed difficult to determine. The Chamber of Commerce believes that "the normal year does not remain on a dead level, but should probably curve upward gradually and conservatively with the growth of population and markets. To do otherwise would indicate industrial stagnation." In the establishment of normal unit overhead charges, the normal overhead expenses for the various departments of the business and normal production must be considered and divided to obtain the normal unit overhead charge. Accidental expenses of the previous years should be wiped out and an effort made to anticipate and allow for trend of expense for the coming year.

According to the chamber, "there is nothing conclusive, final or binding about this estimate of normal expenses. Each month your cost system gives the estimated overhead expenses and the actual expenses. If there is an increase of the actual over the estimated, and upon analysis that increase is found to be a real increase, due to unanticipated increase of salaries or insurance rates, etc., and not inflation arising from reduced production, an adjustment upward can immediately be made in the unit overhead charges. Each concern will establish for itself a safety zone, below or above which decreases or increases in real costs will be reflected and taken up in the selling price." Warning is sounded against placing the normal production at high figures reached only in exceptional years.

# National Underwriters to Approve Bumpers

NEW YORK, March 22—The National Automobile Underwriters Conference has authorized a reduction of 5 per cent in collision insurance rate on commercial cars and trucks equipped with either a radiator guard or a bumper, or both, provided such device or devices have been listed as standard by Underwriters Laboratories. This is contingent on there being at least two truck bumpers and two radiator guards listed prior to July 1, the ruling to take effect on that date.

This announcement is accompanied by the statement that manufacturers of guards, or truck companies which make their own guards, may desire to place their product before the Laboratories for examination in advance of July. On receipt of request from any manufacturer the procedure will be outlined.

Passenger cars now get an allowance for approved front bumper of 10 per cent, rear bumper 2½ per cent, and both front and rear 12½ per cent. This percentage is higher for passenger cars because the damage or loss is greater than in truck collision.

### TO LOWER COLLISION RATES

MILWAUKEE, March 18—Lower collision insurance premium rates for new drivers with new cars, and also for experienced drivers with new cars, in comparison with older passenger cars, is the novel plan to be followed by a mutual insurance company just organized in Milwaukee. Incorporation was granted on March 21 to this company, as the Federal Mutual of Milwaukee. J. J. Helby, president of a casualty company, and who will be elected president of the automobile insurance company, is the author of the new plan in making rates. He says that careful investigation shows that new drivers, and older drivers with new cars, are much more careful.

### SAMSON PRICE REDUCED

JANESVILLE, WIS., March 19—J. A. Craig, president of the Samson Tractor Co., a subsidiary of the General Motors Corp., has announced a 20 per cent reduction in the price of tractors and a 10 per cent cut in the price of power harrows and plows.

# Unit Parts Makers Have Service Plan

## Abolition of Private Parts Maker Important—Credit Demands to Be Higher

(*Continued from page* 674)

station in every important city. Dealers could carry small stocks of parts in the greatest demand and could rely on the parts establishment for less frequently called for articles. The capital tied up in parts would thereby be reduced.

One of the chief advantages would be elimination of the pirate. The parts manufacturers assert the public does not realize the great quantity and variety of inferior parts on the market, and that the average buyer does not comprehend the risk he takes in purchasing parts of this type.

All branches of the automotive industry are in agreement in the belief that the problem of service is one of major importance and that the company which provides the best service will corral the largest number of sales. Sponsors of the nation-wide parts station plan contend that it will give the maker of an assembled vehicle the advantage over manufacturers who build the greater part of their product. Better results are promised with a smaller investment of capital. It also is asserted that with the problem of a parts stock solved for them, dealers in assembled vehicles could devote all their time and capital to original car sales.

Another proposal for stabilization of the industry by the parts makers is denial of credit to the promotor of a vehicle factory who cannot demonstrate he has the capital to reasonably insure success. This would hit the wild-catter who is in to-day and out to-morrow, leaving owners of his vehicles with orphans on their hands and at the mercy of parts pirates.

The advantages of the parts station venture are summarized in this way by one of its enthusiastic sponsors:

**It would eliminate investment in parts by the manufacturers, his distributers and dealers, enabling them to use the money which would otherwise be tied up in parts in the development of sales.**

**It would familiarize the public with the actual value offered in the assembler's products.**

### Would Make Prices Reasonable

**It would enable manufacturers, distributers and dealers to obtain genuine parts at reasonable prices upon short notice in any part of the United States and in foreign countries.**

**It would eliminate the use of inferior parts furnished by pirate manufacturers.**

**It would benefit manufacturers by assuring them of adequate service.**

**It would not interfere with the operations of repair shops, garages or service stations, but would permit them to do business with a smaller investment.**

# Hawkins Goes with General Motors

## Serves as Advisor on Sales Service

### Former Ford Sales Manager Makes New Connection—Widely Known Figure

DETROIT, March 23—Norval A. Hawkins, formerly general sales manager for the Ford Motor Co., will join the General Motors Corp. on April 1 and will be a member of the advisory staff, located at Detroit, handling subjects pertaining to sales, advertising and service.

Hawkins is one of the most widely known sales executives in the industry and the success of the Ford Co. in its early days is regarded as due in large measure to his efforts. Since leaving the Ford Co. he has devoted his time to several enterprises and now is head of Hawkins, Gies & Co., accountants, with offices here. Rumors about Hawkins' future activities have been numerous in the last few months. They have connected him with General Motors, the new W. C. Durant enterprise and the new venture of F. L. Klingensmith.

Since the retirement of Hawkins from the Ford organization there has been much speculation as to his future connections because it was assumed he would remain in the automotive industry. He opened a set of books for Ford in 1903 and for three years served as auditor. He then became sales manager and continued in that capacity for 12 years until January 1919. Besides being president of Hawkins, Gies & Co., he is president of the Sturgis Steel Gocart Co. of Sturgis, Mich., and a director in several other concerns.

## Acceptance Corporation Reorganizes Personnel

NEW YORK, March 24—Curtis C. Cooper was elected president of the General Motors Acceptance Corp. at a meeting this afternon. He was named after a meeting of the stockholders at which these directors were elected: C. C. Cooper, Rlbert L. Deane, Irenee duPont, Lamot du Pont, Pierre S. du Pont, Paul Fitzpatrick, J. Armory Haskell, John J. Raskob, John J. Schumann, r., and Alfred H. Swayne.

Besides making Cooper president, and Swayne chairman of the board, the directors elected the following officers' Vice-presidents, Deane, Schumann, Donald M. Staidal and James H. McMahon; treasurer, Reune Martin; secretary, George H. Bartholomew; auditor, F. Stanley Parson; counsel, Livingston L. Short.

Haskell remains as a director but retired as president because of his other duties as vice-president of the General Motors Corp. in charge of operations. Fitzpatrick also remains on the board but retires as vice-president because of his recent election as vice-president of the General Motors Export Corp. McMahon, who was made one of the vice-presidents of the Acceptance Corporation, was promoted in recognition of his constructive work in credit department.

### FORD COMPANY SELLS LAST OF SURPLUS CARS

DETROIT, March 21—The Ford Motor Co. started operations this week on a six-day basis for the first time since Christmas. The company is now producing almost 3000 cars a day and according to officials orders are catching up rapidly with production. All the surplus cars on hand when the plant closed Dec. 24 have been sold.

## Service Stations Send Call for Mechanics

NEW YORK, March 22—Service stations in this city have in the last week been getting more work than they have in the past three months. Some of the shops have lately been so slack that forces of mechanics have been cut down to the very limit, one shop ordinarily employing eighteen men being reduced to the service manager and one mechanic. The sudden rush of service work has found most of these shops unprepared to take care of orders with the reduced forces and the calls for mechanics are many. Among the shops reporting greatly increased business are Overland, Marmon, Master Truck, Automotive Service Corp., and Chevrolet.

### GRAY EXTENDS ENGINE WORKS

DETROIT, March 19—Announcement is made that under the reorganization of the Gray Motor Co. which will produce a $1500 motor car in the early fall, separate plant units will be organized for its marine and other motor business but they will remain under the same management. The Gray Motor Co. is one of the oldest motor manufacturers in the United States and has nearly 60,000 Gray motors in operation in all parts of the world. It is announced that a new 40 h.p. 4 cylinder overhead valve unit plant will be ready for production and delivery July 1. Marine and other motors will be distributed from the assembling plants which will be established in all parts of the world to handle the new motor car.

## Assert Present Fees Ample in New York

### Organizations Declare Funds for Maintenance Now Realized—Oppose Construction Uses

**ALBANY, N. Y., March 23—The Lowman bill was passed in the Senate to-day after a sharp attack by Senator Lusk upon automobile clubs, which, he declared, were banded together to keep the State from raising through motor vehicle fees the money necessary for the maintenance of its good roads system.**

**Increases in passenger car registration fees range from $2.50 on low powered cars to $6 on high powered cars of more costly make. On motor trucks the increases range from 35 per cent on the lighter models to 50 per cent on those above 5-ton capacity, and as high as 100 per cent on trucks of 10-ton capacity or over.**

ALBANY, N. Y., March 21—Insisting that existing license fees were ample to meet State needs for maintenance and repair of main highways, representatives of forty New York State automobile organizations at a conference here drew up a declaration of opposition to the proposed increased fees and submitted this to the legislative committee in charge. Pending formal action by the legislature, the organizations will get in personal touch with legislators and request support of their position.

Represented at the hearing were the National Automobile Chamber of Commerce, Motor Truck Association of America, Automobile. Dealers Association of New York, New York State Automobile Association, New York State Motor Federation, Central New York Warehousemen's Club, New York Furniture & Warehousemen's Association, Van Owners Association of Greater New York, and many individual clubs of car and truck owners.

The principle that registration fees should be devoted to repair and maintenance of highways only, and that motor vehicle owners should not be burdened with costs of construction or reconstruction, was set forth in plain terms. That returns now from vehicle registration were ample for this purpose was shown.

### UNITED BODY MOVES OFFICES

CLEVELAND, March 21—What is regarded as an important development in automobile circles is seen in the announcement that executive offices of the United Automotive Body Co. have been removed from Springboro, Pa., to this city.

# Congress Outlines Definite Program

## Emergency Tariff, Anti-Dumping Tariff and Internal Revenues, Order of Business

WASHINGTON, March 23—With five sub-committees of the House Ways and Means Committee actually engaged in drafting a permanent tariff schedule, there is evidence of a real effort on the part of Congress to settle the chaotic condition of business and industry through a definite legislative program. Analysis of this program indicates quite strongly that it will be mid-summer before the automotive industry will know what it must contribute to the national exchequer through taxation. The Senate Finance Committee will, however, begin hearings on the internal revenue measures on or before the convening of the extraordinary session April 11.

According to the program outlined by Senator Penrose, chairman of Senate Finance committee, and Chairman Fordney of the House Committee on Ways and Means, the emergency tariff confined to agricultural products, will have the right of way on the calendar. It has been a political boomerang for several months, and Congressional leaders have agreed to pass the original bill without amendment in order to clear the track for other important legislative measures.

President Harding and well-informed leaders favored an emergency tariff confined to high staples but on inquiry found it would never pass with a few items on the list. In order to obtain sufficient Democratic votes for cloture rule, it was found necessary to consent to sectional demands and include 26 agricultural products. The ten months period written in the original bill will be reduced to six months because leaders feel that this period will be adequate. They expect to have the permanent tariff enacted before the expiration of this period.

### To Write Automobile Schedules

Chairman Fordney announced to-day that Congressmen Tilson of Connecticut, Luther Mott of New York and Timberlake of Colorado, would write the schedule for metals and manufactures thereof. The tariff item includes automobiles and automotive products. The sub-committees to handle the free list have not been organized. These sub-committees are expected to report their schedules to the full committee early in the session as the tariff will precede the internal revenue legislation in the House.

That the Senate Finance committee will not call witnesses for tax hearings until next month is indicated in the announcement that Chairman Penrose will be away for several days. It is apparent that these hearings will be brief and representatives of the automotive industry must present clear and concise arguments in the few minutes allotted. If the industry is to oppose the proposed tax levies, it will be necessary to convince the committee of the inequities of the Treasury and other plans, for it must be remembered that this committee will be swamped with suggestions as to sources of revenue and will have little time for study.

Copies of the arguments presented at the hearings will be turned over to the House Ways and Means committee for its guidance in framing tax bills. With an estimate of the yield from the new permanent tariff at hand, the House committee must design internal revenue measures to bring the balance required into the Treasury. The Senate will use the measures originating in the House as a guide for re-drafting or amendments.

It has been tentatively agreed to consider the emergency tariff first, followed by the anti-dumping measure, passage of a bill or amendment providing for assessment of import duties upon the basis of American and not foreign valuation, the permanent tariff and finally the internal revenue bill. Senator Penrose hopes to clean the slate by Aug. 1, although this prediction may be regarded as unduly optimistic in view of the tremendous amount of work at hand.

# Contingency Reserves Reduce Case Surplus

CHICAGO, March 21—Net income of the J. I. Case Threshing Machine Co. in the year ended Dec. 31, 1920, amounted to $2,936,962, as compared with $4,305,211 in 1919. From this was deducted $1,000,000 as contingent reserve, increased dividends on the common and preferred stocks, which left a surplus for the year of only $156,962, compared with $2,843,961 the preceding year.

The income account for the last year compares as follows:

| | 1920 | 1919 |
|---|---|---|
| Gr. sales | $34,547,321 | $32,342,653 |
| Net earns | 4,791,942 | 6,021,607 |
| Bal. aft. int., dpr., Fd. txs. | 2,936,963 | 4,305,211 |
| Contg. res | 1,000,000 | ..... |
| Bd. prm., etc | ..... | 143,761 |
| Extra chgs | ..... | *1,261,968 |
| Net profit | 1,936 693 | 2,909,482 |
| Bal. aft. pfd. divs | 1,026,963 | 2,029,232 |
| Sur. aft. com. divs | 156,963 | 1,448.232 |
| †Earn. per com. share | $7.90 | $15.61 |

*European assets written off.
†Based on $13,000.000 common stock outstanding Dec. 31, 1920. A stock dividend of 39,000 shares was paid Dec. 15, 1920.

### S. A. E. NOMINATES OFFICERS

NEW YORK, March 22—The nominating committee of the Metropolitan Section of the Society of Automotive Engineers, consisting of H. G. McComb, chairman, Norman Bell and C. F. Scott has named the following ticket for officers of the Section for the year 1921-22: For chairman, H. W. Slauson; for treasurer, Ethelbert Favery; for secretary, F. E. McKone; for members of governing board, P. M. Heldt, C. T. Myers and W. E. Kemp. A. M. Wolf, the retiring chairman, becomes vice-chairman, in accordance with the by-laws of the Section.

# New York Engineers Study Brake Action

## Metropolitan Section S. A. E. Hears Interesting Discussions at March Meeting

NEW YORK, March 18—The regular monthly meeting of the Society of Automotive Engineers' Metropolitan Section, held here this evening, was devoted to discussion of brakes and clutches. The principal paper was read by H. G. Farwell, chief engineer of the Raybestos Co., who recently returned from Europe, where he has been making a study of practice in reference to brakes and clutches used on British and continental cars.

He said that most of these brakes are of the expanding type, and that more attention is given to their design and construction than is as a rule given to brakes on American cars. Many metal linings are used in spite of the fact that their coefficient of friction is only about half that of good asbestos linings. Cone clutches are still the predominant type, both leather and fabric being employed for facing, but many plate and multiple disk types are also employed. Four-wheel brakes are seeing wider application and are favorably regarded.

A second paper, presented by W. D. Reese of the Fifth Avenue Coach Co., described the brakes used on the buses operated by this company. Since these vehicles are continually used in traffic where frequent and very certain stops are necessary, the brakes must be extremely rugged and very certain in action. Carefully made tests have shown that the buses in question are capable of a deceleration rate of about 3.75 m.p.h. per sec. on dry smooth asphalt paving. It is estimated that the aggregate number of stops per year made by the buses of this company is 36,000,000. Some 10,000 ft. of brake lining materials per year is required.

R. W. Hastings, chief engineer of the Parker Axle & Products Corp., described the multiple disk type of brake used in axles produced by his company. These brakes closely resemble in design the multiple disk type of clutch, but are applied by toggle linkage.

### Hydraulic Brake Described

A representative of the Four Wheel Hydraulic Brake Co. described the four wheel braking system put out by this company, while A. A. Rost, a dealer in Delage cars, recited experiences with the four wheel braking system used on cars of this make.

In the discussion which followed the paper Clarence Carson, consulting engineer of the H. W. Johns-Manville Co., described the efforts being made by one division of the Standards Committee, in cooperation with the Motor Transport Division of the Quartermaster Corps and the Bureau of Standards, to standardize a method of testing brake linings for durability.

## INDUSTRIAL NOTES

**North Star Mfg. Co.,** Chicago, has taken over the business of the S. & M. Mfg. Co., maker of the North Star glare shield.

**Ekern-Turk Mfg. Co.,** Pipestone, Minn., upon expiration of its contract with H. G. Paro Co., Chicago, will handle all its products through jobbers direct.

**Perfection Heater & Mfg. Co.** has closed a contract with Sheridan Motors Co. whereby Perfection heaters will be standard equipment on all Sheridan closed cars.

**R. C. Smith Tool & Mfg. Co.,** Newark, N. J., has moved into a larger factory in that city, where it will extend the variety of its machine-tool line and its production capacity.

**Motor Car Supply Co.** has been organized in Charleston, W. Va., to do an exclusive jobbing business. The company will have a capital of $150,000. Officers are H. F. Shepherd, president; W. D. Harold, vice-president, and George D. Cochrane, secretary and treasurer.

**Precision Stud & Bolt Co.,** a new Milwaukee corporation, organized with $20,000 capital, has taken over a factory building and after making alterations will install equipment and tools for manufacturing studs, bolts, screws, nuts and other similar mechanical specialties and supplies.

**Robeson Preservo Co.** of Port Huron, Mich., which for 20 years has been manufacturing canvas waterproofing for other lines, has entered the automotive field. The company, according to Carl F. Adams, president, will make a special waterproofing for automobile tops and truck covers.

**Schoeffler-Graham Mfg. Co.,** Milwaukee, recently incorporated with $50,000 capital to take over the machine shop business of Schoeffler & Graham, will hereafter concentrate on a patented horizontal hoist for dump body motor trucks. It has leased considerable floor space to increase the capacity about 100 per cent.

**Utility Hoist & Mfg. Co.,** Milwaukee, has accepted the offer of the business men's club at Prairie du Sac, Wis., to relocate the plant and offices in that city. Prairie du Sac is a rapidly growing industrial community, due largely to the abundance of cheap current from mammoth hydroelectric generating plants on the Wisconsin River at this point.

### FILE RED DIAMOND PETITION

ATLANTA, March 21—An involuntary petition in bankruptcy has been filed in the United States District Court here against the Red Diamond Motors Co., Inc., of Athens, Ga., a company incorporated some months ago with $5,000,000 capital to establish a plant at Athens for the manufacture of a newly invented engine. Stockholders of the corporation are scattered throughout this country and Mexico. No statement of liabilities and assets has yet been filed.

### FEDERAL SHOWS NEW MODELS

DETROIT, March 21—Federal Motor Truck Co. is showing a new 5-ton model at the automobile show, priced at $5,350. The new truck is equipped with a specially designed Continental 4-cylinder engine, 4¾ by 6, and is geared to permit extra high speed adding materially to the efficiency of the truck.

Federal also is showing a new dump body mounted on a 2-ton truck. The truck is so equipped that the front end can be elevated for dumping into manholes or cellars, or the entire body can be elevated to a height six feet above the truck and the front end then raised slightly to permit of dumping across a sidewalk or into window or doorway above the walk. This equipment also makes possible the use of two or three smaller trucks for loading, the body hoisting attachment permitting the dumping into the bed of the heavy truck.

## Bearings Service Pays Bonus to Employees

DETROIT, March 21—The Bearings Service Co., which acts as service department for the Timken Roller Bearing Co., the Hyatt Roller Bearing Co., and the New Departure Mfg. Co., will divide approximately 2 per cent of the net sales for the year 1920 as a bonus fund. All employees who served continuously six months or more participate. The bonus plan provides for a trust fund which pays the participant interest at the rate of 6 per cent a year. The participant is privileged to draw 20 per cent of his bonus each year or he may elect to receive payment in full at the end of five years together with a proportionate share of all forfeitures and excess earnings. Participants are divided into four groups according to length of service and personal efficiency rating. The plan applies to all employees, both in the general office here and in the company's 33 branches.

## Romer Forms Company to Make Passenger Car

BOSTON, March 21—The Romer Motors Corp. has been organized by Albert J. Romer, designer of the Northway passenger car and formerly chief engineer of the Murray Motor Car Co. in association with Frank C. Gilbert, formerly of the Northway Motor Sales Corp. Offices have been opened at 43-57 Cornhill Street in this city, and a factory site of 16 acres has been purchased at Danvers, Mass.

Plans for a factory building are being prepared. The first unit will be a one-story structure 100 x 500 ft. Designs have been completed for passenger car bodies and chassis, and it is expected the first cars will be on the road by June 1.

### TO FORM AVIATION COMPANY

CINCINNATI, March 22—Definite steps to co-operate with the Cincinnati Aero Club in forming a co-operative aviation company to be known as the Commercial Aviation Co. have been taken by the Aviation Committee of the Cincinnati Chamber of Commerce. The aero club is to erect a hangar on Reading Road, this city, and to construct a flying field and furnish instruction in operating machines as well as for commercial purposes. It will be capitalized at $100,000.

## METAL MARKETS

**CAUTION on the part of automotive purchasing agents continues to be the outstanding feature of the iron, steel and non-ferrous metal markets. The tonnage involved in inquiries is much greater than that actually ordered. No better proof that the market is still a buyers' affair is needed than that it is possible to sound producers on 500 tons and meet with no objection on their part when a contract for 100 or 200 tons is offered on the basis of the 500-ton quotation. On the whole, however, new steel orders from automotive concerns are still light, the bulk of shipments from mills consisting of previously suspended orders that have recently been reinstated. In those commodities for which there is a relatively light but, for all that, steadily growing demand, such as pig iron and sheets, values continue flexible, and to that extent the market may be characterized as still unsettled. Each transaction is a law unto itself, price depending upon the individual buyer's skill as a negotiator and the desirability of his business. Influences from outside of the automotive industries make for considerably quickened eagerness on the part of pig iron interests for orders from automotive foundries. In spite of the curtailment of pig iron production to what is very close to the irreducible minimum, much difficulty is encountered in finding consuming outlets for this output, due to the continued idleness of the building industry and lack of railroad demand. As a result of this condition, automotive consumption is receiving far more attention than it formerly did, and every pig iron market letter stresses the resumption of automotive buying as a market prop. The truth of the matter is that, with structural steel operations on a basis of 14 per cent of capacity, railroads and shipbuilders out of the market, and miscellaneous demand very light, the automotive industries are not only the largest but almost the only representative buyers in the market, and this in spite of the fact that automotive production has not yet attained anything like its normal stride. That automotive purchasing agents, in full consciousness of their orders furnishing the stop-gap in this period of transition for the iron and steel industry, proceed with prudent regard for this condition is only natural.**

**Pig Iron.**—Middle West automotive foundries, because of improved labor conditions, are ordering somewhat more iron forward. The Ford Motor Co. is offering pig from its River Rouge furnace to those who hold contracts for Ford castings. About the best way to describe the market for No. 2 foundry is to say that bids of $25, valley, are being listened to.

**Steel.**—Somewhat more activity in automobile sheets is noted. Four cents as the basis for No. 28 black is chiefly used as a level from which to make reductions in order to compete for what business offers. Shipments of cold-finished steel bars and cold-rolled strip steel consist largely of reinstated orders. No representative new business has been placed so far.

**Aluminum.**—Buyers appear still to be holding off.

**Copper.**—Producers contemplate further reduction in output.

**Tin.**—Speculation in London and, to some extent, in New York makes up the sole activity.

**Lead.**—The 'outside" market is now fully ¼c. higher than the chief interests' New York quotation.

**Zinc.**—Continuingly dull.

## *Bank Credits*

*Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, March 24—There was scarcely any trace of last week's shifting of funds incident to the income and excess profits tax payments in the week-end bank statements, nor was there any outstanding feature in the money market which could be ascribed to the operations on March 15. On the other hand, there was an easier tone in the money market, especially after the first two days of the week. Call money ranged from 6 per cent to 7 per cent with 7 per cent as the renewal rate all week, but with the bulk of the business in the latter part of the week done at 6 per cent. On Monday of this week the renewal rate dropped to 6½ per cent, the lowest renewal rate since the latter part of January. While there was a relaxation in time money rates the supply was not plentiful. Rates dropped to 6½ per cent to 7 per cent for all maturities up to 5 months, and 6½ per cent to 6¾ per cent for 6 months' paper. The shorter maturities were in greatest demand. The return of funds to the banks following the tax payments is said to have been partially responsible for the easing of rates.

The improvement made in the reserve ratio of the Federal Reserve Banks as a whole is greater than the figures show in view of the new method used in calculating the deposits. The ratio of total reserves to net deposits and Federal Reserve note liabilities combined increased from 50.9 per cent to 51 per cent (on the old basis of figuring this 51 per cent would be about 52½ per cent). The ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, increased from 59.9 per cent to 60.6 per cent. These increases were caused largely by a decline in net deposits of $180,905,000 and a decline in Federal Reserve note circulation of $42,960,000, and by increases in gold reserves of $18,133,000 and cash reserves of $17,365,000. Federal Reserve notes in circulation, at $2,962,880,000, are at the lowest figure since Feb. 13, 1920, and are $442,000,000 below the amount shown in the Christmas-week statement. The decline in rediscounts is an additional sign of increasing strength. Rediscounts decreased $143,500,000 and are down $506,000,000 from the December high. Total earning assets declined $138,097,000.

Reports from the steel industry continue to show decreasing output. The U. S. Steel Corp. is working at about 45 per cent of capacity as against 60 per cent the week before, and the independents are said to be working at from 15 per cent to 25 per cent of capacity. The whole industry is working at a rate to produce about 16,000,000 tons of steel ingots per year, far below the rate for recent years but 17 per cent more than during the lean year of 1908. On the other hand there is said to be a perceptible increase in the demand in the trade.

Wholesale prices are still tending downward. Dun's reports show that for the forty-fifth consecutive week wholesale prices of commodities have a downward trend. Last week there were 77 reductions out of 101 revisions of wholesale prices; the week before there had been 59 out of 81. This is in line with the reports of slow recovery in the West, where the buying power of agriculturalists is still at a low ebb in view of low prices received for farm products. The Western mail-order houses reflect this in their reports for the first two months of the year. One of the largest mail-order houses in the country reports February sales of 50.35 per cent less than for February, 1920, and 10 per cent less than for January this year. The two months sales are reported to be 48.69 per cent less than for the corresponding period of a year ago.

Revised figures for the cotton production of 1920 as given by the Census Bureau may explain, together with the trade reaction and the decreased consumption at home and abroad, the present stagnation in the cotton industry.

## Republic Truck Shows Deficit of $344,564

NEW YORK, March 22—The annual report of the Republic Motor Truck Co. for the year ended Dec. 31, 1920, shows after expenses, interest charges and adjustment of inventory values, etc., a deficit of $344,564.

The consolidated income account of Republic Motor Truck Co., Inc., and Republic Truck Sales Corp. for the year 1920 is as follows:

| | 1920 |
|---|---|
| Sales | $15,675,221 |
| Manufacturing costs | 12,793,001 |
| Balance | $2,882,220 |
| Other income | 269,406 |
| Total income | $3,151,626 |
| Expenses, interest, charges, etc. | 2,592,444 |
| Net profit | $559,182 |
| Prov. for bos. stock and in. adj. | 903,746 |
| Deficit | $344,564 |
| Preferred dividends | 60,634 |
| Total deficit | $405,198 |
| Profit and loss surplus | $1,508,806 |

### BARLEY MOTORS LOSES SUIT

KALAMAZOO, MICH., March 18—A. C. Barley, president of the Barley Motor Car Co., has been denied a motion for a new trial in the suit brought against him by the American National Bank, of Nashville, Tenn. Judge George V. Weimer, of the Kalamazoo County Circuit Court, filed the opinion. The plaintiff brought suit to recover the contract price on certain automobile frames sold the Barley Motor Car Co. and won the case.

### CORRECTION

A typographical error in AUTOMOTIVE INDUSTRIES last week was responsible for the statement that W. A. Ryan is general manager of the Ford plant. Ryan is general sales manager, which position he has held several years.

## FINANCIAL NOTES

**Dunlop Tire & Rubber Corp. of America** has placed a $6,000,000 mortgage on its Buffalo plant with the Fidelity Trust Co. The plant is about 90 per cent completed and will have a capacity of about 12,500 tires daily.

**Times Square Auto Supply Co., Inc.,** shows net profits for 1920 as $10,831 after preferred dividends and depreciation. Inventory is placed at $4,178,605 after writing off a depreciation of $919,000.

**Kelsey Wheel Co.** reports gross sales of $25,200,913 for 1920 and net operating profits of $3,325,804. Net profits for the year after depreciation, Federal taxes and fixed charges were $1,916,008. President Kelsey said the net profits were the largest the company has ever shown.

**International Body Corp.** of Newark, N. J., has been placed in receivership on application of two former officers of the company, who say that the company never began to function in the making of automobile bodies. The company was organized with a capital of $1,000,000. The bill of complaint fixes its assets at $38,000 and its unsecured liabilities at half that amount.

**American La France Fire Engine Co.** declared the regular quarterly dividends of 2½ per cent on the common and 1¾ per cent on the preferred stock. The common is payable May 16 and the preferred April 1. The company's balance sheet shows total assets of $8,574,594, with a surplus of $1,405,010.

**Parish & Bingham Corp.** reports net sales for 1920 as $9,128,443; cost of sales, depreciation, etc., $9,089,814; manufacturing profit, $38,629; selling, general and administrative expense, $203,492; deficit, $164,863; other charges, $192,726; deficit, $357,589; dividends, $450,000; deficit, $807,589; previous surplus, $3,139,952; total surplus, $2,332,363. The balance sheet shows total assets and liabilities of $5,686,770.

**Jordan Motor Car Co.** has declared a regular quarterly dividend payable March 31 to stockholders of record March 18.

### COURT STOPS REYNOLDS SALE

MT. CLEMONS, MICH., March 23—The Circuit Court of Macomb county has declined to confirm the sale of the assets of the Reynolds Motor Truck Co. by Charles J. Reimold, the receiver, to Charles M. Kennan, for $26,250. Kennan operates a garage in this city. The report filed with the court stated that the bid of Kennan was the only one received but it was held by the judge to be inadequate and it is understood that since that time Reimold has been able to get offers from two other persons who would be willing to buy the property.

### WASHINGTON OFFICERS CHANGE

SPOKANE, WASH., March 21—John B. White, president of the Washington Tire & Rubber Co. has resigned and J. L. Bowling, who was vice-president, has been selected to succeed him. Roy Hayes, a Waverly farmer, has been elected a trustee to fill the vacancy caused by White's retirement. The company has not been in operation for several months

# Men of the Industry

**Harvey J. Woodard** has resigned as vice-president in charge of sales of the Republic Rubber Corp. of Youngstown, Ohio, and as president of the Canton-Blackstone Co. of Canton, Ohio, its affiliated subsidiary. Woodward went to Youngstown in 1917 to take charge of sales of the Republic Rubber Corp. Previous to joining the Republic corporation, Woodard was with the Knight Tire Co. of Canton, Ohio, as sales manager and, prior to that time, twelve years with the Diamond Rubber Co., serving from 1903 to 1912 as their district sales manager in New York.

**Paul Fitzpatrick,** who has been a vice-president of the General Motors Acceptance Corp., has resigned to become vice president of the General Motors Export Corp. Fitzpatrick left the Continental Guaranty Co. to go with General Motors and played a prominent part in the organization of the Acceptance Corporation. He is regarded as an expert on financing of automobile time sales. He recently returned from a tour of inspection of the Acceptance Corporation's offices in Europe. It is understood that several changes among the officers of the Acceptance Corporation will be announced after a meeting this week.

**Henry W. Uhl** has severed his connection with the Eisemann Magneto Corp., Brooklyn, effective April 1. Uhl's activities were centered chiefly upon the Eisemann magneto generator for 4-cylinder engines, also the new automatic advance type magneto. He has been connected with the engineering staff of the corporation since October, 1916. Uhl has not made any statement in regard to his future plans.

**Walter F. Graham** has resigned as metallurgist with the Spicer Mfg. Co., Plainfield, N. J., and is now associated with the Henry Souther Engineering Co., consulting, metallurgical and inspecting engineers, Hartford, Conn. Graham was formerly associated with the late Henry Souther as metallurgist for the Standard Roller Bearing Co. and subsequently with the Ferro Foundry & Machine Co. and the Ingersoll-Rand Co.

**Herbert W. Bonnell,** general manager of the Kissel Kar Co. of Milwaukee, distributor of the Kissel in Wisconsin, has resigned to accept the position of vice-president and general manager of the William F. Sims Motor Car Co., Milwaukee, State distributor of the Lincoln. Bonnell was for five years manager of the Mitchell Automobile Co. of Milwaukee, going to the Kissel Kar Co. about three and a half years ago.

**Arthur E. Swanson,** organization and efficiency expert of the Firestone Tire & Rubber Co., has resigned and will establish offices as a consulting efficiency expert in Akron. Swanson formerly was dean of the School of Commerce of Northwestern University. During the war he served as special expert for the United States Shipping Board and was also bureau director for the Federal War Trade Board.

**William C. Jenkins** of New York has joined the Bull Dog Tractor Co. of Fond du Lac, Wis., in the capacity of fiscal and advertising director. He was for twelve years on the editorial staff of the "National Magazine," Boston, and previously spent many years in newspaper work in Wisconsin.

**W. R. Melcher,** formerly Eastern representative of the Gemco Mfg. Co., has returned to his first love, C. A. Shaler Co., Waupun, Wis., with whom he was associated during 1918-19. Melcher will act in the capacity of special jobbers' service representative on Shaler vulcanizers and the Shaler road-lighter.

**Alfred Reeves,** general manager of the National Automobile Chamber of Commerce, will address the Pittsburgh Automotive Association on March 31 and the Philadelphia Automobile Dealers Association on April 1. The subject in both cities will be "1921 Prospects for the Automotive Industry."

**L. G. Meldram,** who has had wide experience in the motor truck, passenger car and export fields, has been appointed general manager of the Trailer Maufacturers Association, to succeed H. W. Perry, who resigned. Perry has not announced his plans for the future.

**E. J. Thomas** has been named private secretary to Vice-President and Factory Manager P. W. Litchfield of the Goodyear Tire & Rubber Co. of Akron. He succeeds George Miley, who is assigned as registrar at the Goodyear Industrial University for employees.

**Edward J. Waltzer** has been elected president of the Wisconsin Tool & Supply Co., Milwaukee, following his acquirement of the major interest in the business, in which he has been a stockholder since early last fall. William H. Lawton continues as vice-president and chief engineer.

**C. S. Heimbauch** has been appointed manager of the Des Moines branch of the J. I. Case Plow Works Co. He has been identified with the implement business since 1897, in recent years being sales manager of a Kansas City business in which he had a part interest.

**H. C. Walker,** managing director of Hooper & Co., Ltd., of London, returned to England Tuesday after a short stay in this country, during which he investigated the prospect for the sale of English-built automobile bodies here.

**James W. Brooks** has resigned as educational director of the Federal Highway Council and will make motion pictures visualizing educational problems and industrial progress. Associated with him will be John W. Wierk, formerly of Brooklyn.

**R. G. Hendricks,** who was connected with the King Motor Car Co. under the old régime as factory manager and who was retained by Charles Finnegan when he purchased the King assets, has resigned. Hendricks has not announced future plans.

**James J. Harrington** of Cincinnati has been appointed supervisor of all foreign branches of the Ford Motor Co., with headquarters in London, England, succeeding W. C. Anderson, who resigned recently.

**Ward H. Marsh** has been appointed sales and advertising manager of the Lincoln Motor Car Co., Detroit, resigning as advertising manager of the Burroughs Adding Machine Co. to take the position.

**W. E. Finnigan** has resigned as general sales-manager of the Gray-Dort Motors, Ltd., Chatham, Ont., and is now general director of sales with the Ruggles Motor Truck Co., Ltd., London, Ont.

**Carl W. Bettcher** has been appointed sales manager of the Eastern Machine Screw Corp., New Haven, Conn. He will give his special attention to the H. & G. die-head business of the company.

**Fred McCarthy** has resigned as sales engineer with the Jennings Corporation to join the C. C. Merz Sales Co., Pittsburgh distributors of H. C. S. cars.

**Fred W. Cederleaf** has resigned as chief engineer of the Sparks-Withington Co. to join the Ziegler Mfg. Co., Alexandria, Ind., as works manager.

**Harry E. Marshall** has been appointed Pacific Coast representative of the Mueller Electric Co. of Cleveland and will maintain offices in San Francisco.

**H. M. Carroll** has been appointed advertising and sales promotion chief of the Remy Electric Co. He was formerly connected with the Hyatt Roller Bearing Co.

**A. H. Heller,** metallurgical engineer, has become a partner in the Day Company of Washington and San Francisco.

## Stewart Manufacturing Shows Slight Decrease

CHICAGO, March 18—Profits of the Stewart Mfg. Co., of which 95 per cent of the stock is owned by the Stewart-Warner Speedometer Co., showed a decrease during the year ended Dec. 31, 1920. In the previous year operating profits totaled $349,736 and in the past year, $272,897. Dividends were smaller, however, during the year just ended and there was a material reduction in the provision for Federal taxes, this resulting in a surplus for the year of only $2.000 less than for the year previous.

The income account with comparisons is as follows:

| | 1920 | 1919 |
|---|---|---|
| Operating profits | $272,897 | $349,736 |
| Provided for Federal taxes | 36,810 | 83,811 |
| Preferred dividend | 20,974 | 33,810 |
| Common dividend | 180,000 | 195,000 |
| Surplus for year | 35,113 | 37,115 |

## Withdraw Junker Planes from Air Mail Service

WASHINGTON, March 22, 1921—All Junker planes owned by the Post Office Department have been withdrawn from service and under the recommendations of a special committee investigating numerous accidents to these machines while in flight, will be thoroughly tested at the McCook Aviation Field, Ohio. The committee which conducted an inquiry into the recent fatality at La Crosse, Wis., consisted of Major McCord, in charge of the Army Air Service offices at Chicago, John A. Jordon, superintendent of construction, Air Mail Service of the Post Office Department, and Randolph G. Page, chief pilot.

### EDWARD LISLE, SR., DROWNED

Edward Lisle, Sr., founder of the Star and Briton motor companies at Wolverhampton and a pioneer British automobile builder, was drowned recently. He was 69 years old. He is said to have suffered from insomnia as a result of business worries. Lisle was a practical mechanic and introduced a British copy of the Benz 3½ hp. belt driven small car about 1899. Lisle, who was one of the old type of Englishmen, was much respected.

# Calendar

**SHOWS**

April 3-9—Denver, Annual Automobile Show, Auditorium.

April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.

**FOREIGN SHOWS**

April, 1921—Sofia, Bulgaria, Tractor Trials, under the Bulgarian Ministry of Agriculture.

Apr. 20 - May 5—Mexico City, Mexican Automobile Show, National Theatre Bldg.

May 28, 1921—Czecho-Slovak International Automobile Exposition of Cars, Trucks, Tractors, Motorcycles and Equipment. Prague.

May 28-June 8—International Automobile Exhibition, Basle, Switzerland.

June, 1921—Reykjavik, Iceland, Agricultural Exhibition—Agricultural Machinery—Icelander Agricultural Society, Reykjavik, Iceland.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

**CONVENTIONS**

May 4-7—Cleveland, National Foreign Trade Council.

May 17-19—Buffalo, Convention of Factory Service Managers, Auspices of Service Committee, N. A. C. C.

May 24-28—West Baden, Ind., Summer Meeting Society of Automotive Engineers, West Baden Springs Hotel.

Oct. 12-14, 1921—Chicago Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

**RACES**

June 18—Uniontown, Pa., Speedway Events.

July 25—Grand Prix, Le Mans.

Labor Day—Uniontown, Pa., Autumn Classic.

**S. A. E. MEETINGS**

Buffalo section—April 19—Paper on "Carbureter Performance," by F. C. Mock.

Dayton section—May 3.

Metropolitan section—April 14—Paper on "Low Grade Fuel Carburetion," by A. H. Beach.

Minneapolis section—April 6—Discussion of repair equipment.

Washington section—April 1—Aeronautical Engineering Session.

## Importers Organize in Mexican Capital

(*Continued from page* 674)

and of $100 for associate members, were fixed, with $50 monthly dues for the active and $25 for the associate. The association is controlled by a board of directors elected for two years, with a general manager named each month to carry out the plans and instructions.

An annual automobile show, automobile tours of the republic, and truck and tractor demonstrations in the agricultural sections of the republic are among the plans. The new association is a member, by virtue of the American firms on its rolls, of the American Chamber of Commerce in Mexico, and of the Association of Chambers of Commerce of Mexico. The president of the association, Carlos Wille, at the first meeting named committees on associate memberships, on a monthly publication, on good roads, tours and shows, and on legislation and statistics.

Mexico City firms—the active members of the association—are listed as follows:

National Auto Importing Co., Moore & Cummings, R. Lozano & Co., Lamborn & Co., Siemens-Schuckert Werke, Mohler & De-Gress, Mexico Motors Co., International Commerce Co., Pena Motor Sales Co., J. M. Marquez, Plana & Mirabent, B. Estades & Co., American Motor Co., Compania Automotriz Mexicana, Compania Unida de Ventas, Azcarraga & Copeland, Mayfield Auto Co., F. J. Meckel and R. G. Canton, Inc.

Because of the extensive road-building program which has been inaugurated by the new government of Mexico, the Department of Communications and Public Works, and the Department of Development, are interested in the new association, and have applied for membership, at the same time offering all facilities of the government for the aid of the association in its program of automobile shows, truck and tractor demonstrations and road building. The balance of power in the association is in the hands of foreigners, mainly Americans and Germans, but all the newspapers express the hope that more Mexican business men will come into the association by taking up agencies.

## WILLYS' COAST HOME BOUGHT BY CHRYSLER

DETROIT, March 18—Announcement has been made in Toledo that John N. Willys has sold his home site at Pasadena, Cal., to Walter P. Chrysler for a sum approximating $200,000. Chrysler is executive vice-president of the Willys Corporation.

## British Exports Gain as Imports Decline

LONDON, March 10 (*Special Correspondence*)—British automobile imports for January numbered 513 cars and 364 car chassis, and 1095 trucks and truck chassis. These were valued at approximately $686,390, $624,410, and $900,000 respectively. Parts imports were valued at $2,782,340. Tractor imports valued at $742,145 compared with imports of $566,285 for January, 1920. Tire imports were valued at $1,545,610, a decrease from $1,757,990 in January, 1920. In every case but tractors imports showed a marked falling off.

Automobile exports for January increased in value from $459,445 in January, 1920, to $1,588,805 for January, 1921. Car chassis exports increased from $405,000 to $910,965. Truck exports also showed large increases over January, 1920. Parts exports showed a gain from $1,697,420 in 1920, to $3,539,275 in 1921. Tractor exports totalled $725,115 as compared with $106,805 in 1920. Tire exports fell off from $2,379,730 in 1920, to $1,758,360 in the current year.

### $6,000,000 FOR LOUISIANA ROADS

NEW ORLEANS, March 21—Approximately $6,000,000 of Federal, State and local funds are available for highway and bridge construction in Louisiana this year, according to the apportionment of the bureau of public roads of the Department of Agriculture, on a basis of information compiled from reports.

## Nineteen Cars to Race for Grand Prix Trophy

PARIS, March 19—Entries for the French Grand Prix 321-mile race have now definitely closed with a total of 19 cars representing France, England, Italy and America. The competitors, together with the names of the drivers so far as they are known, are as follows:

| | | |
|---|---|---|
| 1 | Ballot | Jean Chassagne |
| 2 | Ballot | Ralph de Palma |
| 3 | Ballot | |
| 4 | Ballot | |
| 5 | Fiat | Louis Wagner |
| 6 | Fiat | Pietro Bordino |
| 7 | Fiat | Ferdinando Minoia |
| 8 | Sunbeam | Rene Thomas |
| 9 | Sunbeam | Andre Boillot |
| 10 | Talbot | Dario Resta |
| 11 | Talbot | K. Lee Guinness |
| 12 | Talbot-Darracq | Zobrowski |
| 13 | Talbot-Darracq | Seagreave |
| 14 | Talbot-Darracq | H. J. Cooper |
| 15 | Mathis | |
| 16 | Duesenberg | Albert Guyot |
| 17 | Duesenberg | Inghibert |
| 18 | Duesenberg | Tom Milton |
| 19 | Duesenberg | Eddie Hearne |

All cars in the race are limited to a piston displacement of 183 cu. in., with a maximum weight empty of 1763 lb. Eight in line engines will predominate, having been adopted by Ballot, Sunbeam, Talbot, Talbot-Darracq and Duesenberg. The Italian Fiats have four-cylinder engines, but experiments are being carried out with eights in line.

The number of starters is lower than was expected, this being due in a large measure to the high entry fees fixed by the Automobile Club of France. The fee for a single car is 15,000 francs, while the Duesenbergs which came in after January 1 had to pay double fees, or 86,000 francs for a team of four cars.

### TO HOLD OLYMPIA TRUCK SHOW

LONDON, March 1—(*Special Correspondence*)—The date of the 1921 passenger car show at Olympia has been fixed for Nov. 4 to 12. Thus it will not clash with the Paris salon in October, nor the Brussels show in December.